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SHARP 13N-M100 SERVICE MANUAL

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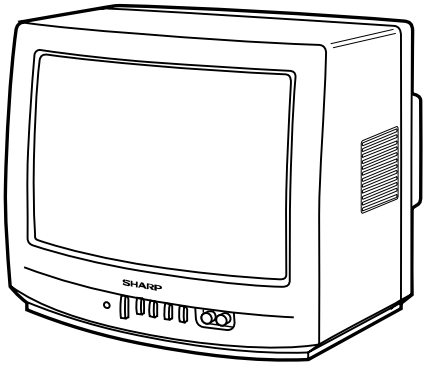
SHARP SERVICE MANUAL

S10V213N-M100



COLOR TELEVISION

Chassis No. SN-000

MODELS 13N-M100/150 CN13M10

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

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ELECTRICAL SPECIFICATIONS

POWER INPUT ..... 120 V AC 60 Hz
POWER RATING ..... 69 W
PICTURE SIZE ..... 580cm^2 (89.8sq inch)
CONVERGENCE ..... Magnetic
SWEEP DEFLECTION ..... Magnetic
FOCUS ..... Hi-Bi-Potential Electrostatic
INTERMEDIATE FREQUENCIES
  Picture IF Carrier Frequency ..... 45.75 MHz
  Sound IF Carrier Frequency ..... 41.25 MHz
  Color Sub-Carrier Frequency ..... 42.17 MHz (Nominal)
AUDIO POWER
  OUTPUT RATING ..... 0.9W (at 10% distortion)
SPEAKER
  SIZE ..... 8 cm (Round)
  VOICE COIL IMPEDANCE ..... 32 ohm at 400 Hz
ANTENNA INPUT IMPEDANCE
  VHF/UHF ..... 75 ohm Unbalanced
TUNING RANGES
  VHF-Channels ..... 2 thru 13
  UHF-Channels ..... 14 thru 69
  CATV Channels ..... 1 thru 125
  (EIA, Channel Plan U.S.A.)

Specifications are subject to change without prior notice.

SHARP CORPORATION

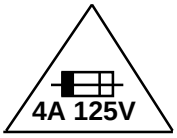
This document has been published to be used for after sales service only.
The contents are subject to change without notice.

IMPORTANT SERVICE SAFETY PRECAUTION

■ Service work should be performed only by qualified service technicians who are thoroughly familiar with all safety checks and the servicing guidelines which follow:

WARNING

1. For continued safety, no modification of any circuit should be attempted.
2. Disconnect AC power before servicing.
3. Semiconductor heat sinks are potential shock hazards when the chassis is operating.
4. The chassis in this receiver has two ground systems which are separated by insulating material. The non-isolated (hot) ground system is for the B+ voltage regulator circuit and the horizontal output circuit. The isolated ground system is for the low B+ DC voltages and the secondary circuit of the high voltage transformer.
   To prevent electrical shock use an isolation transformer between the line cord and power receptacle, when servicing this chassis.



CAUTION: FOR CONTINUED PROTECTION AGAINST A RISK OF FIRE, REPLACE ONLY WITH SAME TYPE 4A-125V FUSE.

SERVICING OF HIGH VOLTAGE SYSTEM AND PICTURE TUBE

When servicing the high voltage system, remove the static charge by connecting a 10k ohm resistor in series with an insulated wire (such as a test probe) between the picture tube ground and the anode lead. (AC line cord should be disconnected from AC outlet.)

1. Picture tube in this receiver employs integral implosion protection.
2. Replace with tube of the same type number for continued safety.
3. Do not lift picture tube by the neck.
4. Handle the picture tube only when wearing shatterproof goggles and after discharging the high voltage anode completely.

X-RADIATION AND HIGH VOLTAGE LIMITS

1. Be sure all service personnel are aware of the procedures and instructions covering X-radiation. The only potential source of X-ray in current solid state TV receivers is the picture tube. However, the picture tube does not emit measurable X-Ray radiation, if the high voltage is as specified in the "High Voltage Check" instructions.
   It is only when high voltage is excessive that X-radiation is capable of penetrating the shell of the picture tube including the lead in the glass material. The important precaution is to keep the high voltage below the maximum level specified.
2. It is essential that servicemen have available at all times an accurate high voltage meter.
   The calibration of this meter should be checked periodically.
3. High voltage should always be kept at the rated value –no higher. Operation at higher voltages may cause a failure of the picture tube or high voltage circuitry and;also, under certain conditions, may produce radiation in exceeding of desirable levels.
4. When the high voltage regulator is operating properly there is no possibility of an X-radiation problem. Every time a color chassis is serviced, the brightness should be tested while monitoring the high voltage with a meter to be certain that the high voltage does not exceed the specified value and that it is regulating correctly.
5. Do not use a picture tube other than that specified or make unrecommended circuit modifications to the high voltage circuitry.
6. When trouble shooting and taking test measurements on a receiver with excessive high voltage, avoid being unnecessarily close to the receiver.
   Do not operate the receiver longer than is necessary to locate the cause of excessive voltage.

IMPORTANT SERVICE SAFETY PRECAUTION

(Continued)

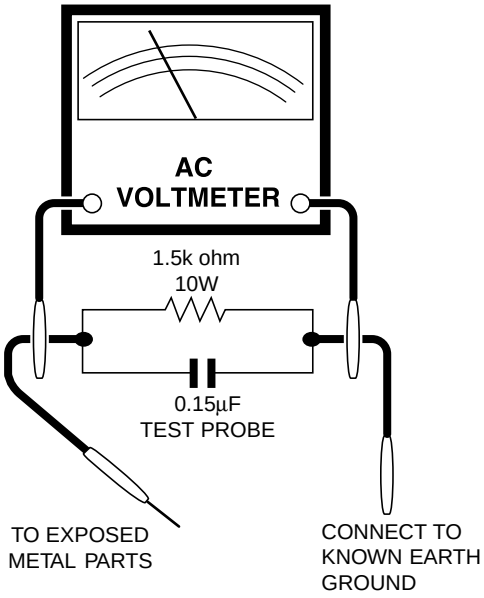
BEFORE RETURNING THE RECEIVER

(Fire & Shock Hazard)

Before returning the receiver to the user, perform the following safety checks.

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the receiver.
2. Inspect all protective devices such as non-metallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators and etc.
3. To be sure that no shock hazard exists, check for leakage current in the following manner.

- Plug the AC cord directly into a 120 volt AC outlet, (Do not use an isolation transformer for this test).
- Using two clip leads, connect a 1.5k ohm, 10 watt resistor paralleled by a 0.15µF capacitor in series with all exposed metal cabinet parts and a known earth ground, such as electrical conduit or electrical ground connected to earth ground.
- Use an AC voltmeter having with 5000 ohm per volt, or higher, sensitivity to measure the AC voltage drop across the resistor.
- Connect the resistor connection to all exposed metal parts having a return to the chassis (antenna, metal cabinet, screw heads, knobs and control shafts, escutcheon and etc.) and measure the AC voltage drop across the resistor.
  AII checks must be repeated with the AC line cord plug connection reversed. (If necessary, a non-polarized adapter plug must be used only for the purpose of completing these check.)
  Any current measured must not exceed 0.5 milliamp. Any measurements not within the limits outlined above indicate of a potential shock hazard and corrective action must be taken before returning the instrument to the customer.



SAFETY NOTICE

Many electrical and mechanical parts in television receivers have special safety-related characteristics. These characteristics are often not evident from visual inspection, nor can protection afforded by them be necessarily increased by using replacement components rated for higher voltage, wattage, etc.
Replacement parts which have these special safety characteristics are identified in this manual; electrical components having such features are identified by "⚠" and shaded areas in the Replacement Parts Lists and Schematic Diagrams.

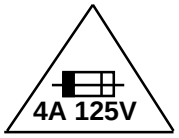
For continued protection, replacement parts must be identical to those used in the original circuit. The use of substitute replacement parts which do not have the same safety characteristics as the factory recommended replacement parts shown in this service manual, may create shock, fire, X-radiation or other hazards.

PRECAUTIONS A PRENDRE LORS DE LA REPARATION

■ **Ne peut effectuer la réparation qu' un technicien spécialisé qui s'est parfaitement accoutumé à toute vérification de sécurité et aux conseils suivants.**

AVERTISSEMENT

1. N'entreprendre aucune modification de tout circuit. C'est dangereux.
2. Débrancher le récepteur avant toute réparation.
3. Les déversoirs thermiques à semi-conducteurs peuvent présenter un danger de choc électrique lorsque le réceqteur est en marche.
4. Le châssis de ce récepteur possède deux systèmes de masse qui sont séparées par du matériel d'isolation. Le système de masse non-isolée (sous tension) est pour le circuit du régulateur de tension B+ et le circuit de sortie horizontale. Le système de masse isolée est pour les tensions DC B+ basses et le circuit secondaire du transformateur haute tension. Pour éviter tout risque d'électrocution lors de l'entretien de ce châssis, utiliser un transformateur d'isolation entre le cordon de ligne et la prise de courant.



PRECAUTION: POUR LA PROTECTION CONTINUE CONTRE LES RISQUES D'INCENDIE, REMPLACER LE FUSIBLE PAR UN FUSIBLE DE MEME TYPE 4A-125V.

REPARATION DU SYSTEME A HAUTE TENSION ET DU TUBE-IMAGE

Lors de la réparation de ce systéme, supprimer la charge statique en branchant une résistance de 10 kΩ en série avec un fil isolé (comme une sonde d'essai) entre la mise à la terre du tube-image et le fil d'anodel. (Le corden d'alimentation doit être retiré de la prise murale.)

1. Le tube image dans ce récepteur emploie une protection intégrée contre l'implosion.
2. Par mesure de sécurité, changer le tube-image pour un tube du même numéro de type.
3. Ne pas lever le tube-image par son col.
4. Ne manipuler le tube-image qu'en porant des lunettes incassables et qu'après avoir déchargé totalement la haute tension.

LIMITES DES RADIATIONS X ET DE LA HAUTE TENSION

1. Tout le personnel réparateur doit être instruit des instructions et procédés relatifs aux radiations X.
   Le tube-image, seule source de rayons X dons les téleviseurs transistorisés, n'émet pourtant pas de rayons mesurables si la haute tension est maintenue à un niveau préconisé dans la section "Vérification de la haute tension".
   C'est seulement quand la haute tension est excessive que les rayons X peuvent entrer dans l'enveloppe du tube-image y compris le conducteur de verre. Il est important de maintenir la haute tension en-dessous du niveau spécifié.
2. Il est essentiel que le réparateur ait sous la main un voltmètre à haute tension qui doit être périodiquement étalonné.
3. La haute tension doit toujours être maintenue à la valeur de régime -et pas plus haute. L'opération à des tensions plus élevées peut entraîner une panne du tube-image ou du circuit à haute tension et, dans certaines conditions, peut entraîner une radiation dépassant les niveaux préscrits.
4. Quand le régulateur à haute tension fonctionne correctement, il n'y a aucun problème de radiation X. Chaque fois qu'un châssis couleurs est réparé, la luminosité doit être examinée bout en contrôlant la haute tension à l'aide d'un voltmètre pour s'assurer que la haute tension ne dépasse pas la valeur spécifiée et qu'elle soit correctement réglée.
5. Ne pas utiliser un tube-image autre que celui spécifié et ne pas effectuer de modifications déconseillées du circuit à haute tension.
6. Lors de la recherche des pannes et des mesures d'essai sur un récepteur qui présente une haute tension excessive, éviter de s'approcher inutilement du récepteur.
   Ne pas faire fonctionner le récepteur plus longtemps que nécessaire pour localiser la cause de la tension excessive.

PRECAUTIONS A PRENDRE LORS DE LA REPARATION

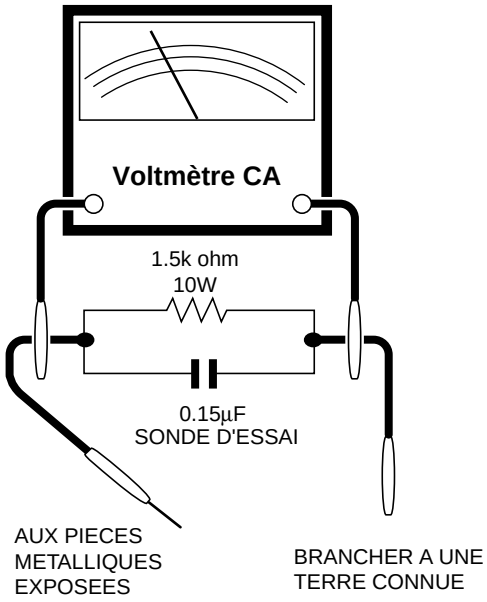
(Suite)

VERIFICATIONS CONTRE L'INCEN-DIE ET LE CHOC ELECTRIQUE

Avant de rendre le récepteur à l'utilisateur, effectuer les vérifications suivantes.

1. Inspecter tous les faisceaux de câbles pour s'assurer que les fils ne soient pas pincés ou qu'un outil ne soit pas placé entre le châssis et les autres pièces métalliques du récepteur.
2. Inspecter tous les dispositifs de protection comme les boutons de commande non-métalliques, les isolants, le dos du coffret, les couvercles ou blindages de réglage et de compartiment, les réseaux de résistance-capacité, les isolateurs mécaniques, etc.
3. S'assurer qu'il n'y ait pas de danger d'électrocution en vérifiant la fuite de courant, de la facon suivante:

- Brancher le cordon d'alimentation directem-ent à une prise de courant de 120V. (Ne pas utiliser de transformateur d'isolation pour cet essai).
- A l'aide de deux fils à pinces, brancher une résistance de 1,5 kΩ 10 watts en parallèle avec un condensateur de 0,15µF en série avec toutes les pièces métalliques exposées du coffret et une terre connue comme une conduite électrique ou une prise de terre branchée à la terre.
- Utiliser un voltmètre CA d'une sensibilité d'au moins 5000Ω/V pour mesurer la chute de tension en travers de la résistance.
- Toucher avec la sonde d'essai les pièces métalliques exposées qui présentent une voie de retour au châssis (antenne, coffret métallique, tête des vis, arbres de commande et des boutons, écusson, etc.) et mesurer la chute de tension CA en-travers de la résistance. Toutes les vérifications doivent être refaites après avoir inversé la fiche du cordon d'alimentation. (Si nécessaire, une prise d'adpatation non polarisée peut être utilisée dans le but de terminer ces vérifications.)
  Tous les courants mesurés ne doivent pas dépasser 0,5 mA.
  Dans le cas contraire, il y a une possibilité de choc électrique qui doit être supprimée avant de rendre le récepteur au client.

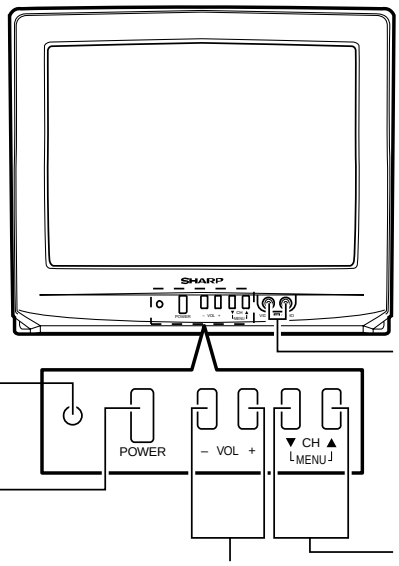


AVIS POUR LA SECURITE

De nombreuses pièces, électriques et mécaniques, dans les téléviseurs présentent des caractéristiques spéciales relatives à la sécurité, qui ne sont souvent pas évidentes à vue. Le degré de protection ne peut pas être nécessairement augmentée en utilisant des pièces de remplacement étalonnées pour haute tension, puissance, etc.
Les pièces de remplacement qui présentent ces caractéristiques sont identifiées dans ce manuel; les pièces électriques qui présentent ces particularités sont identifiées par la marque " ⚠ " et hachurées dans la liste des pièces de remplacement et les diagrammes schématiques.
Pour assurer la protection, ces pièces doivent être identiques à celles utilisées dans le circuit d'origine. L'utilisation de pièces qui n'ont pas les mêmes caractéristiques que les pièces recommandées par l'usine, indiquées dans ce manuel, peut provoquer des électrocutions, incendies, radiations X ou autres accidents.

LOCATION OF USER'S CONTROL

Front Panel



SENSOR AREA FOR REMOTE CONTROL

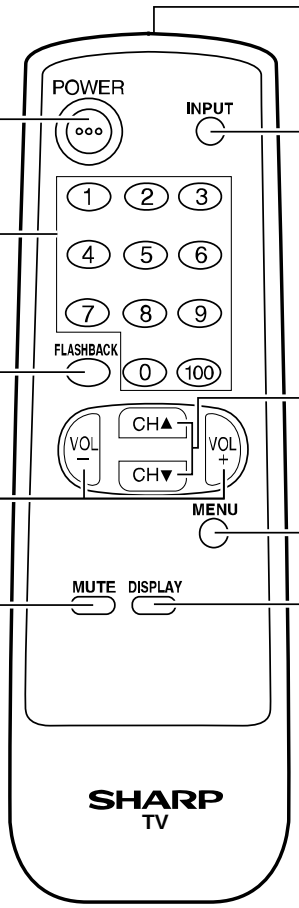
POWER
Press → On.
Press again → Off.

VIDEO/AUDIO IN TERMINALS

VOLUME UP/DOWN
(+) Increases sound.
(–) Decreases sound.

CHANNEL UP/DOWN – MENU
(▲) Selects next higher channel.
(▼) Selects next lower channel.
• Press both at the same time to access the MAIN MENU screen.

Basic Remote Control Functions



Infrared Transmitter Window

POWER
Press → On.
Press again → Off.

REMOTE KEYPAD
Accesses any channel from keypad.

FLASHBACK
Returns to previous channel.

VOLUME UP/DOWN
(+) Increases sound.
(–) Decreases sound.
• In menu mode, changes or selects the TV adjustments.

MUTE
Press → Mutes sound.
Press again → Restores sound.
• CLOSED CAPTION appears when sound is muted.

INPUT
Press → Switch to external video input mode.
Press again → Switch to TV mode.

CHANNEL UP/DOWN
(▲) Selects next higher channel.
(▼) Selects next lower channel.
• Moves the " ⬍ " mark of the MENU screen.

MENU
Press → Accesses MAIN MENU.
Press again → Exits MAIN MENU.

DISPLAY
Press → Displays receiving channel for four seconds.
Press again → Removes display.
• Temporarily displays receiving channel when in Closed Caption mode.

INSTALLATION AND SERVICE INSTRUCTIONS

Note: (1) When performing any adjustments to resistor controls and transformers use non-metallic screwdrivers or TV alignment tools.
(2) Before performing adjustments, the TV set must be on at least 15 minutes.

CIRCUIT PROTECTION

The receiver is protected by a 4.0A fuse (F701), mounted on PWB-A, wired into one side of the AC line input.

X-RADIATION PROTECTOR CIRCUIT TEST

After service has been performed on the horizontal deflection system, high voltage system, B+ system, test the X-Radiation protection circuit to ascertain proper operation as follows:

1. Apply 120V AC using a variac transformer for accurate input voltage.
2. Allow for warm up and adjust all customer controls for normal picture and sound.
3. Receive a good local channel.
4. Connect a digital voltmeter to TP653 and make sure that the voltmeter reads 21.3 ±1.5V.
5. Apply external 27.9V DC at TP653 by using an external DC supply, TV must be shut off.
6. To reset the protector, unplug the AC cord and make a short circuit between TP651 and TP652. Now make sure that normal picture appears on the screen.
7. If the operation of the horizontal oscillator does not stop in step 5, the circuit must be repaired before the set is returned to the customer.

HIGH VOLTAGE CHECK

High voltage is not adjustable but must be checked to verify that the receiver is operating within safe and efficient design limitations as specified checks should be as follows:

1. Connect an accurate high voltage meter between ground and anode of picture tube.
2. Operate receiver for at least 15 minutes at 120V AC line voltage, with a strong air signal or a properly tuned in test signal.
3. Enter the service mode and select the service adjustment "S03" and Bus data "01" (Y-mute on).
4. The voltage should be approximately, 24.0kV (at zero beam).
   If a correct reading cannot be obtained, check circuitry for malfunctioning components. After the voltage test, make Y-mute off to the normal mode.

For adjustments of this model, the bus data is converted to various analog signals by the D/A converter circuit.

Note: There are still a few analog adjustments in this series such as focus and master screen voltage. Follow the steps below whenever the service adjusment is required.

To enter the service mode and exit service mode.

While pressing the Vol-up and Ch-up buttons at the sametime, plug the AC cord into a wall socket.
Now, the TV set is switched on and enters the service mode.
To exit the service mode, turn the television off by pressing the power button.

1. Service mode.

Before putting unit into the service mode, check that customer adjustments are in the normal mode. Use the reset function in the video adjustment menu to ensure customer control are in their proper (reset) position.

2. Service number selection.

In the service mode, you will see the window screen as window ①. There are 3 adjustment categories ②DEF, ③SIGNAL, ④FIX VALUE as show in **Figure A**.

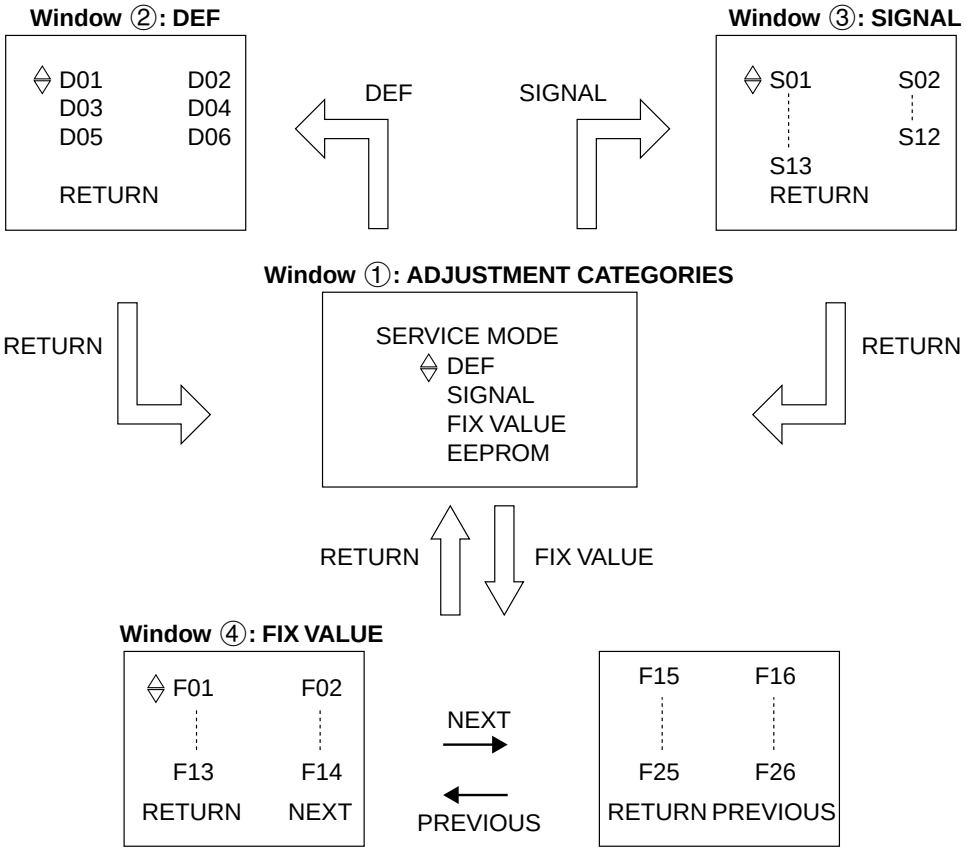


Figure A: ADJUSTMENT CATEGORIES

Press CH UP/DOWN button for selection and enter by VOL UP or VOL DOWN.
Press CH UP/DOWN button to select the adjustment item and VOL UP/DOWN to adjust the data number for each categories.
(OSD disturbance can be erased by R/C display key)
(Note: EEPROM-factory used only)

Below are the adjustments ranges and initial values for FIX VALUE category.

FIX VALUE

SERVICE POSITION	ADJUST ITEM	DATA		
		RANGE	INITIAL VALUE	(Hex)
F01	OPTION 1	00-FF	B0	*
F02	OPTION 2	00-FF	04	04
F03	E-SAVE	00-3F	23	2A
F04	TUNER SETUP	00, 01	00	00
F05	R-TONE RD	00-7F	19	03
F06	R-TONE BD	00-7F	00	7C
F07	B-TONE RD	00-7F	00	00
F08	B-TONE BD	00-7F	12	04
F09	FM LEVEL	00-1F	0C	0C
F10	AFC GAIN	00, 01	00	00
F11	G DRIVE	00, 0F	00	0F
F12	FBT BLK SW	00,01	01	01
F13	V COMP	00-07	07	07
F14	OSD CONT	00-03	02	01
F15	SHARPNESS	00-3F	19	19
F16	FLT SYS	00-07	00	00
F17	KILLER OP	00-07	04	02
F18	PRE SHOOT	00-03	03	00
F19	CORING	00-03	04	04
F20	DC REST	00-03	02	02
F21	BS START	00-03	01	01
F22	BS GAIN	00-03	01	01
F23	ABL START	00-07	00	00
F24	R/B ANGLE	00-0F	08	08
F25	H BLK R	00-0F	04	03
F26	H BLK L	00-0F	04	06

* Must be "B0" for 13N-M100/150, "A0" for CN13M10

Table - A

Below are the ranges and initial values for each adjustment and in each categories.

DEF

SERVICE POSITION	ADJUST ITEM	DATA		ADJUSTMENT CONTENTS
		RANGE	INITIAL VALUE	
D01	H-PHASE	00-1F	0C	
D02	V-SIZE	00-7F	40	
D03	V-POSITION	00-3F	20	Must be "20"
D04	CC-POSITION	00-FF	1A	
D05	V-LINEARITY	00-1F	10	Must be "12"
D06	V-S-CORRECTION	00-1F	10	Must be "0F"

Table - B

SIGNAL

SERVICE POSITION	ADJUST ITEM	DATA		ADJUSTMENT CONTENTS
		RANGE	INITIAL VALUE	
S01	RF AGC	00-3F	14	
S02	VIDEO LEVEL	00-07	03	
S03	Y-MUTE	00-03	00	"01": Y-MUTE, "02": V-STOP & Y-MUTE "03": Activate color killer circuit.
S04	SUB BIAS	00-FF	40	Must be "60"
S05	R-BIAS	00-FF	00	
S06	G-BIAS	00-FF	00	
S07	B-BIAS	00-7F	00	
S08	R-DRIVE	00-7F	40	
S09	B-DRIVE	00-7F	40	
S10	CONTRAST	00-7F	5A	
S11	TINT	00-7F	40	
S12	COLOR	00-7F	40	
S13	BRIGHTNESS	00-7F	40	

Note: Refer to the SERVICE ADJUSTMENT for each corresponding values.

Table - C

Holding down both the Vol-up/Ch-down buttons on the TV set at service mode for more than 2 seconds will automatically write the above initial values into IC2101.

PART REPLACED	ADJUSTMENT		NOTES
	NECESSARY	UNNECESSARY	
IC2001		X	Data is stored in IC2101.
IC201	X		The adjustment is needed to compensate for characteristics of parts including IC201.
IC2101	X		Holding down both the Vol-up/Ch-down buttons on the TV set in the service mode for more than 2 seconds will automatically write the above initial values into IC2101.
CRT	X		Adjust items related to picture tube only.

Table - D

■ SERVICE ADJUSTMENT

RF AGC Adjustment

1. Receive a good local channel.
2. Enter the service mode signal category and select the service adjustment "S01".
3. Set the data value to point where no noise or beat appears.
4. Select another channel to confirm that no noise or beat appears.
   Note: You have to exit the service mode first to select another channel.

Video Level (TV Det Video Level) Adjustment

1. Receive a good local channel.
2. Enter the service mode signal category and select the service adjustment "S02".
3. Set the data value to "02" first, then adjust the data in ranges 02 ±2 step to obtain a normal contrast level.

Screen adjustment

1. Connect to oscilloscope probe between TP855 and ground of the CRT unit.
2. Receive a good local channel.
3. Enter the service mode Signal category and set the service adjustment "S04" to step 60. Then select the service adjustment "S12" and set the data value to "00" to set the color level to the minimum level. (record the original data first). You may skip this step, if you selected a B/W picture or monoscope pattern. Set also the "S05/S06/S07" data to minimum level.
4. Select the service adjustment "S03" and set the data value to "01" to turn off the luminance signal (Y-mute).
5. Select the service adjustment "S13" and adjust the data value to obtain 2.40 volts as shown in **Figure B**.
6. Adjust the master screen control untill the raster darkens to the point where raster is barely seen.
7. Adjust the service adjustment "S05" red, "S06" green, "S07" blue to obtain a good grey scale with normal white at low brightness level.
8. Select the service a adjustment "S03" and reset data to "00". Select the service adjustment "S12" and reset data to obtain normal color level.
9. Remove probe and reset the master screen control to obtain normal brightness range.

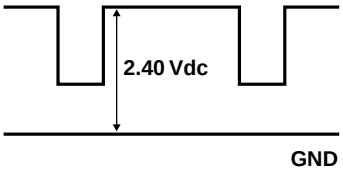


Figure B: WAVEFORM FOR SCREEN ADJUSTMENT

White Balance Adjustment.

1. Receive a good local channel.
2. Select the service adjustment "S12" and set the data value to "00" to set the color level to the minimun. You may skip this step, if you selected a B/W picture or monoscope.
3. Alternately adjust the service adjustment data of "S08" and "S09" untill a good grey scale with normal white is obtained.
4. Select the service adjustment "S12" and reset data to obtain normal color level.

Sub-Picture Adjustment

1. Receive a good local channel.
2. Make sure the customer picture control is set to maximum.
3. Enter the service mode and select the service adjustment "S10".
4. Adjust the data value to achieve normal contrast range.

Sub-Tint Adjustment

1. Receive a good local channel.
2. Set the customer tint control to the center of it's range.
3. Enter the service mode and select the service adjustment "S11".
4. Adjust "S11" data value to obtain normal fresh tones.

Sub-Color Adjustment

1. Receive a good local channel.
2. Make sure the customer color control is set to center position.
3. Enter the service mode and select the service adjustment "S12".
4. Adjust "S12" data value to obtain normal color level.

Sub-Brightness Adjustment

1. Receive a good local channel.
2. Make sure the customer brightness control is set to center position.
3. Enter the service mode and select the service adjustment "S13".
4. Adjust "S13" data value to obtain normal brightness level.

Vertical-Size, V-Linearity, V-S Correction Adjustment

1. Receive a good local channel.
2. Enter the service mode DEF category and select the adjustment "D02" for Vertical Size, "D05" for V-Linearity and "D06" for V-S Correction Adjustment.
3. Set in order "D05" for V-Linearity, "D06" for V-S Correction and set the data to get the best linearity.
4. Then adjust "D02" data unitll it become a proper vertical size.

Horizontal Position Adjustment

1. Receive a good local channel.
2. Enter the service mode DEF category and select the adjustment "D01".
3. Adjust "D01" data value to center the picture.

Vertical-Phase Adjustment

1. Receive a good local channel.
2. Enter the service mode DEF category and select the adjustment "D03".
3. Adjust "D03" bus data to get the most acceptable vertical position.
   Note: The step range is 20 ±10.

Caption Position Adjustment (Horizontal)

1. Receive a good local channel.
2. Enter the service mode DEF category and select the adjustment "D04".
3. A black text box will appear on the screen. (see **Figure C**. below)
4. Adjust "D04" data value to balance the text box position in the center. (A=B).

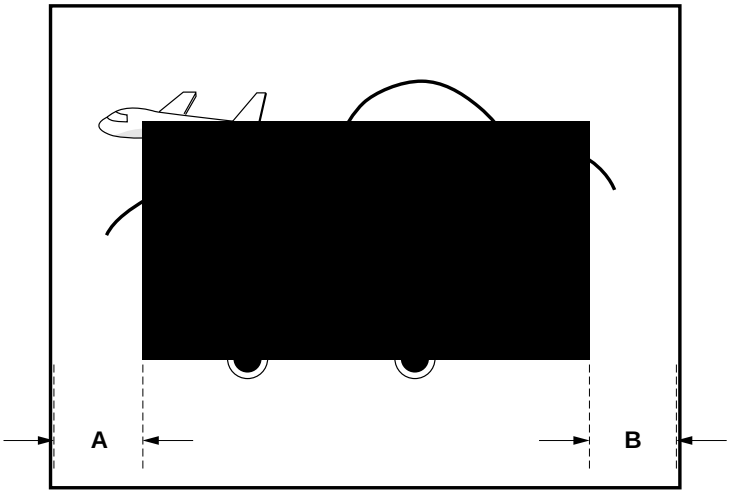
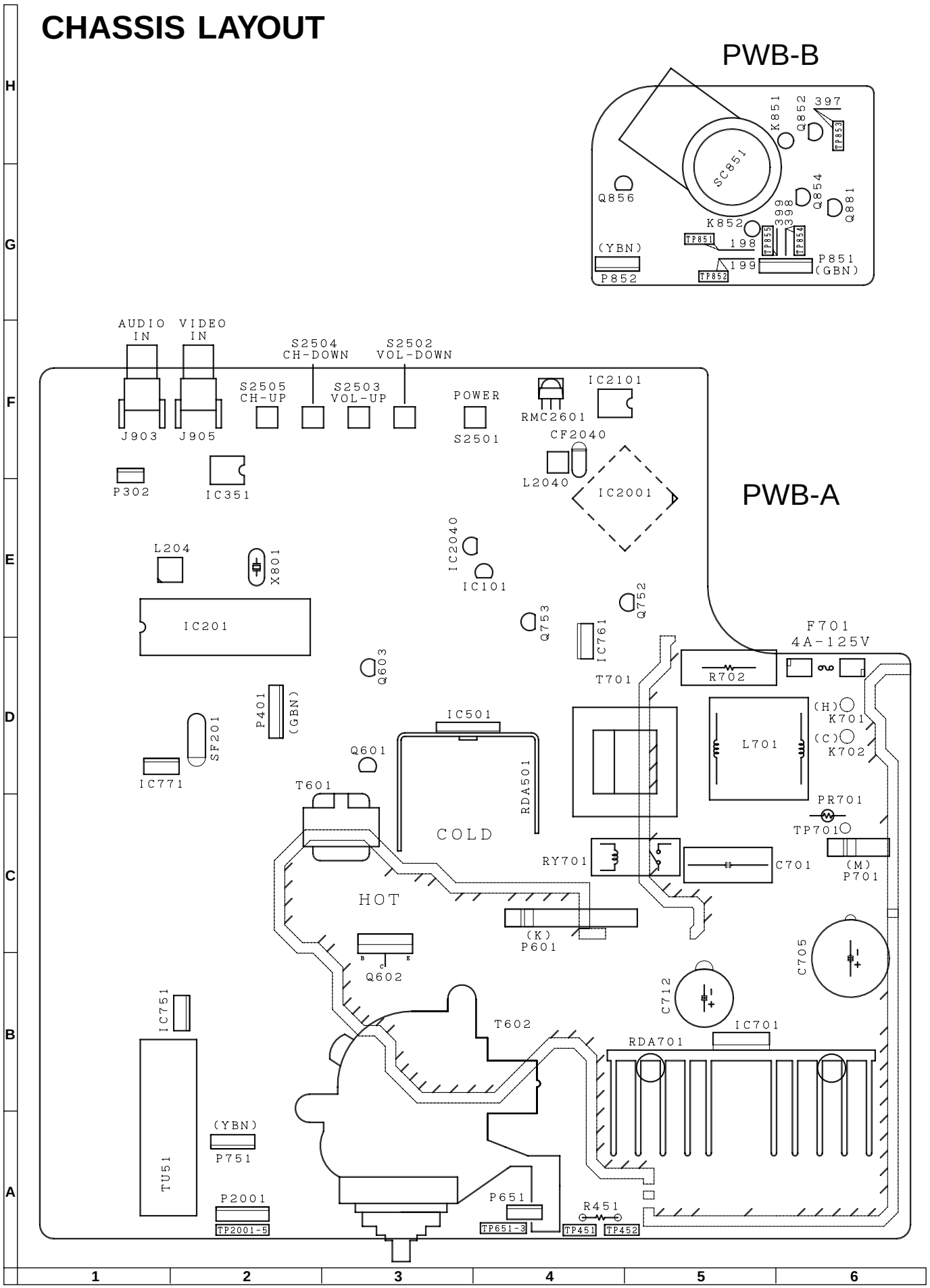
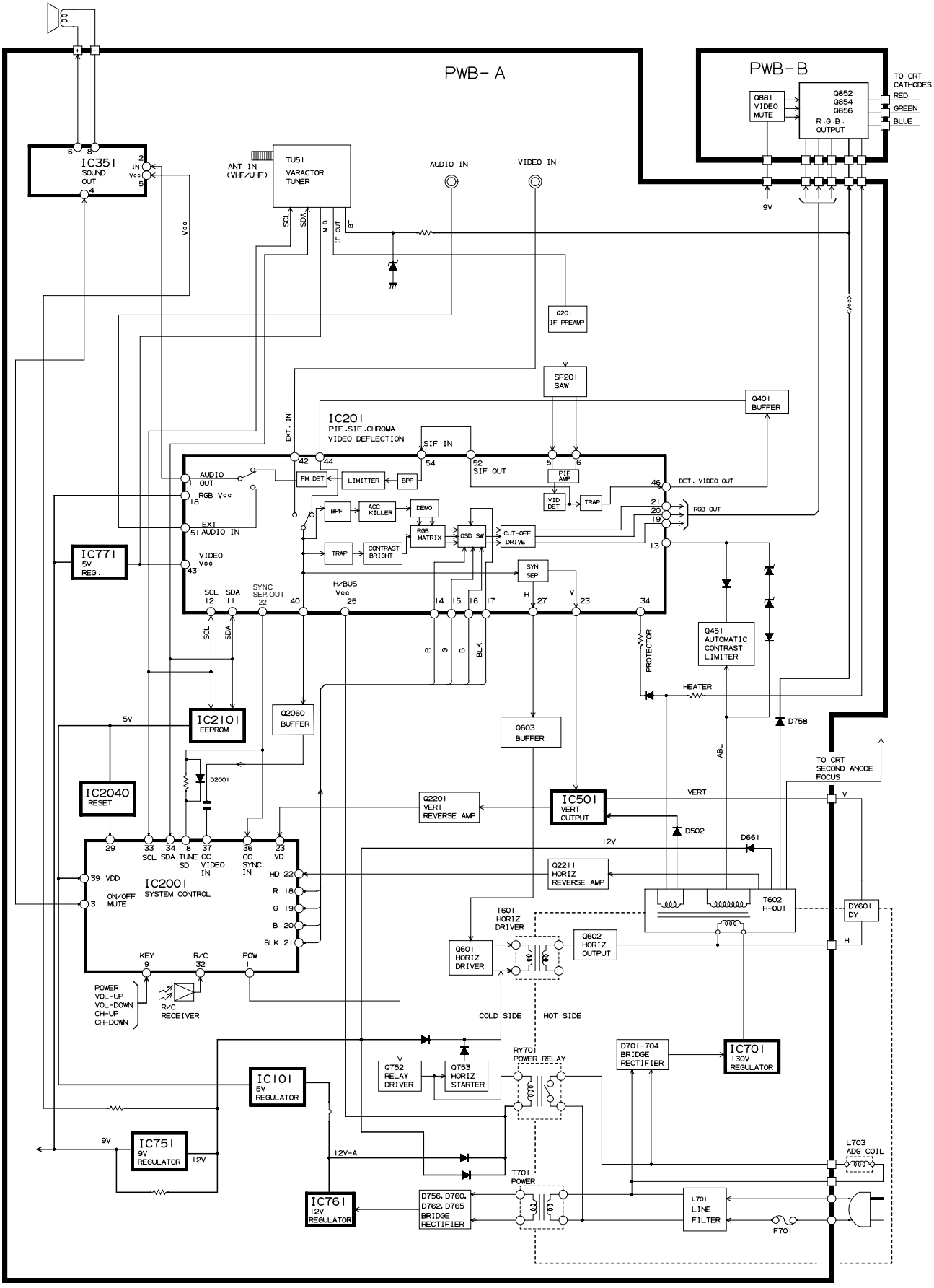


Figure C.

CHASSIS LAYOUT



BLOCK DIAGRAM



DESCRIPTION OF SCHEMATIC DIAGRAM

NOTES:

1. *The unit of resistance "ohm" is omitted. (K=kΩ=1000Ω, M=MΩ)*
2. *All resistors are 1/10 watt, unless otherwise noted.*
3. *All capacitors are μ F, unless otherwise noted. (P=pF=μμF)*
4. *(G) indicates ±2% tolerance may be used.*
5. *⏚ indicates line isolated ground.*

VOLTAGE MEASUREMENT CONDITIONS:

1. *All DC voltages are measured with DVM connected between points indicated and chassis ground, line voltage set at 120V AC and all controls set for normal picture unless otherwise indicated.*
2. *All voltages measured with 1000μ V B & W or Color signal.*

WAVEFORM MEASUREMENT CONDITIONS:

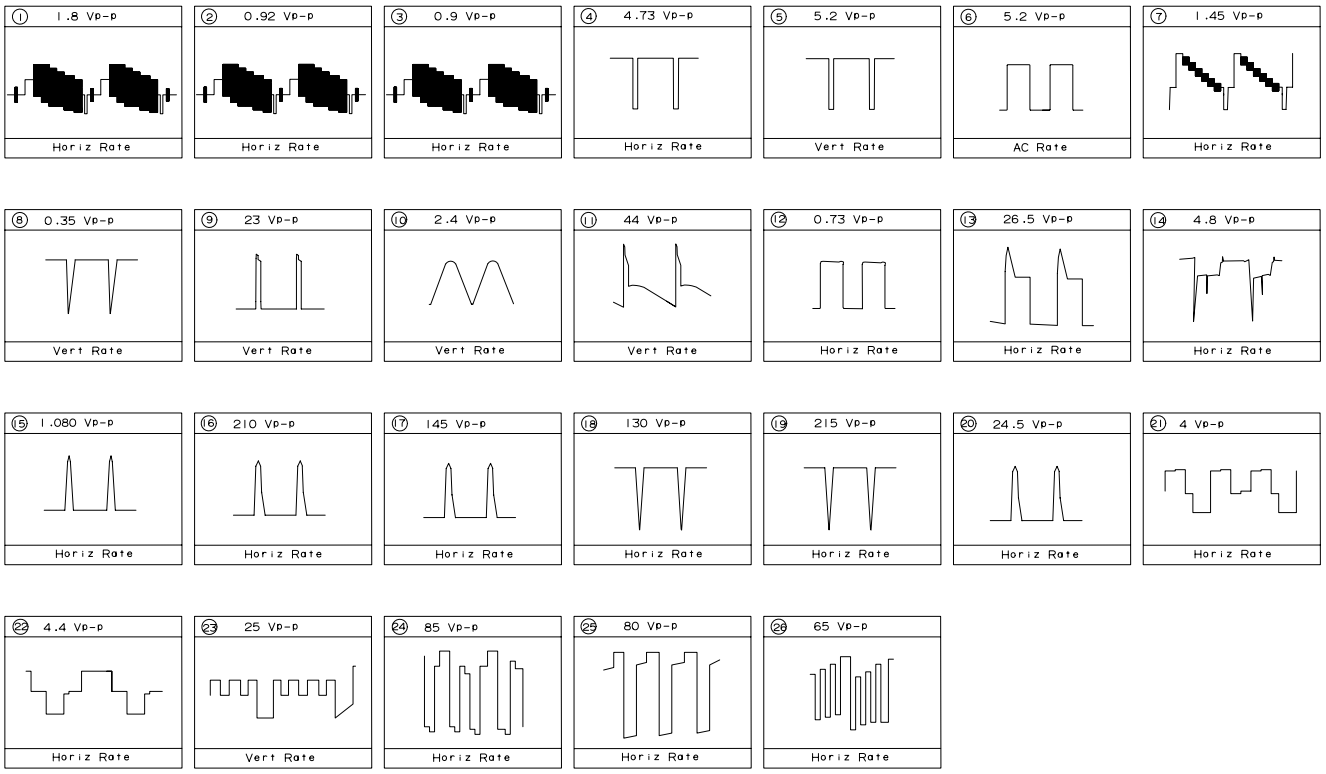
1. *Photographs taken on a standard gated color bar signal, the tint setting adjusted for proper color. The wave shapes at the red, green and blue cathodes of the picture tube depend on the tint, color level and picture control.*
2. *indicates waveform check points (See chart, waveforms are measured from point indicated to chassis ground.)*

⚠ AND SHADED ( ) COMPONENTS = SAFETY RELATED PARTS.
▲ MARK= X-RAY RELATED PARTS.

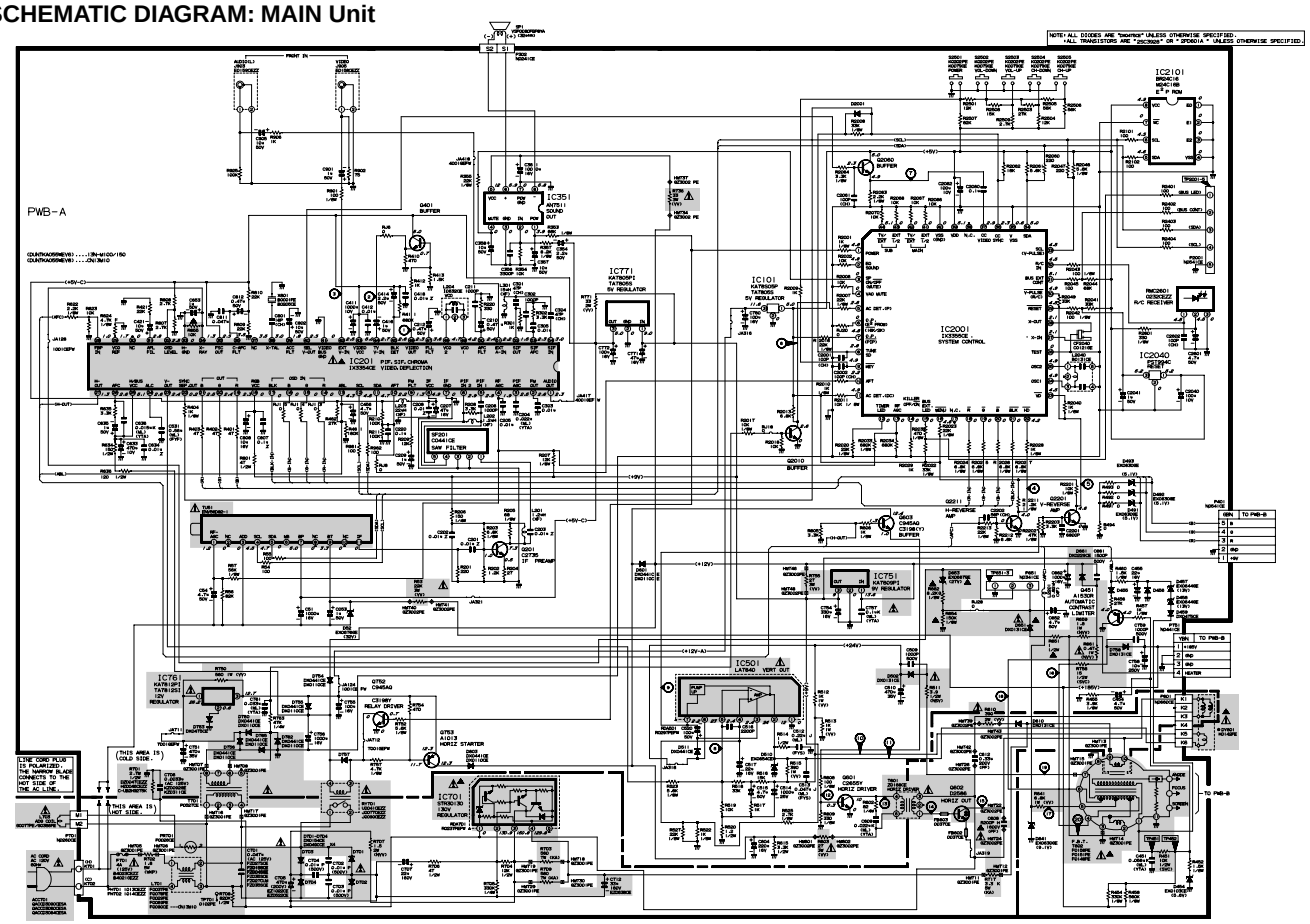
DRGANNES MARQUES ⚠ ET HACHRES ( ): PIECES RELATIVES A LA SECURITE.
MARQUE ▲ : PIECS RELATIVE AUX RAYONS X.

This circuit diagram is a standard one, printed circuits may be subject to change for product improvement without prior notice.

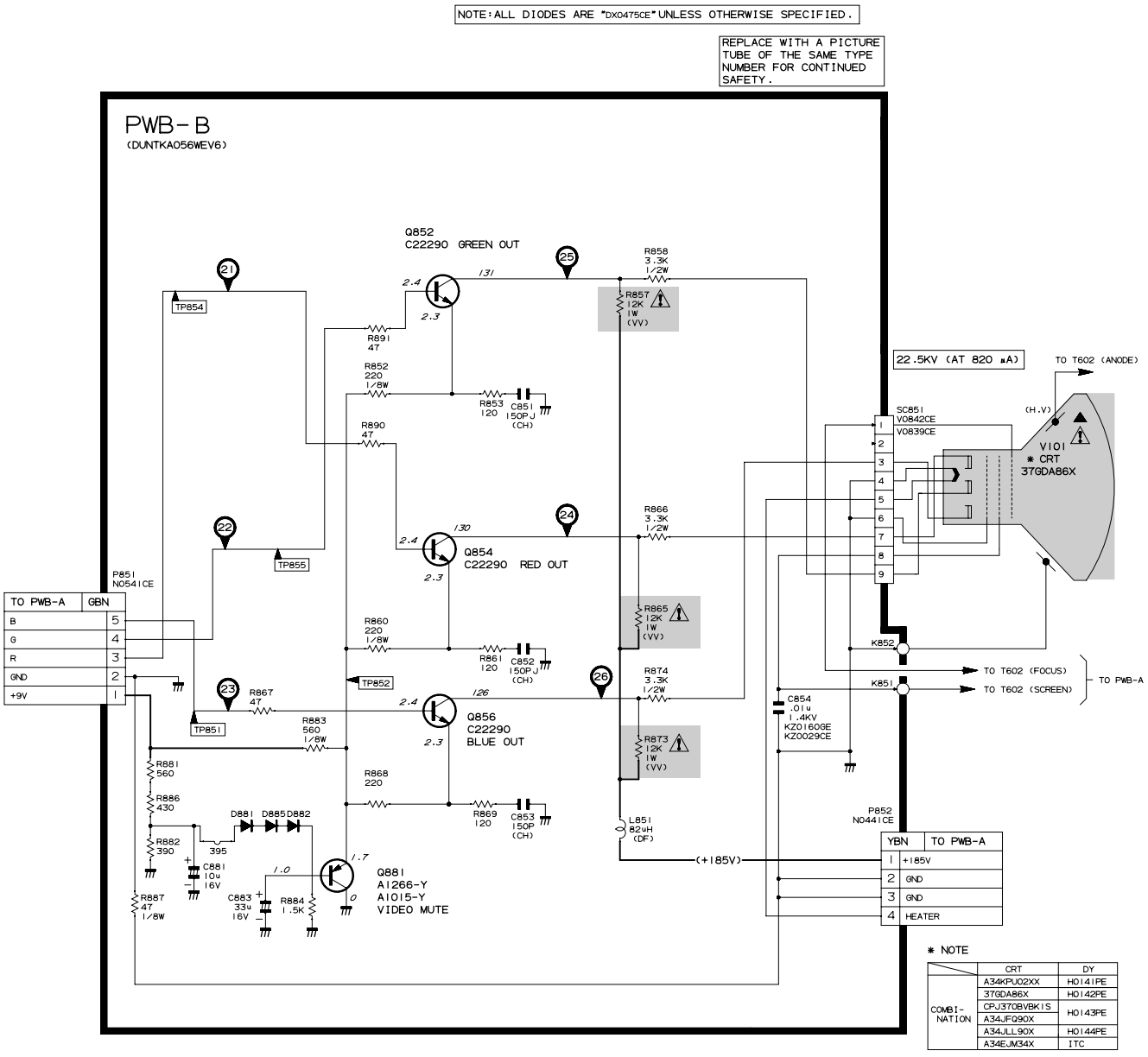
WAVEFORMS



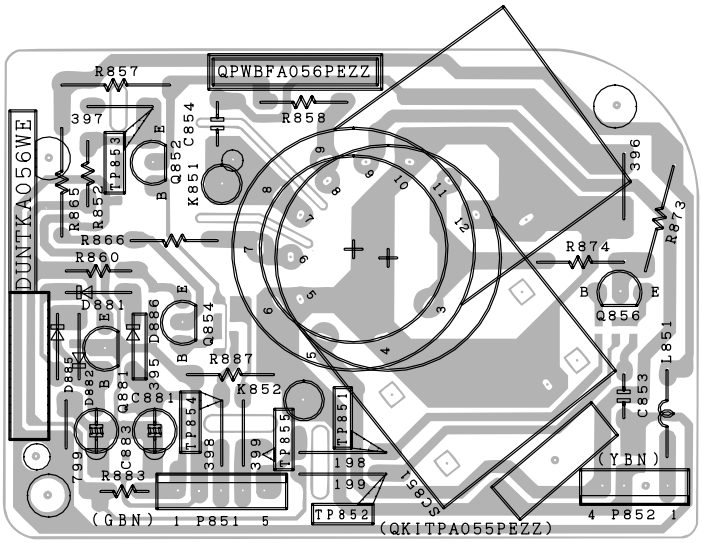
SCHEMATIC DIAGRAM: MAIN Unit



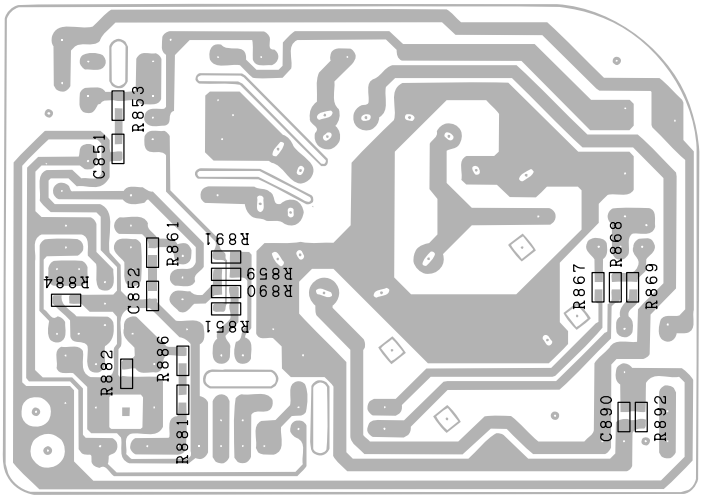
SCHEMATIC DIAGRAM: CRT Unit



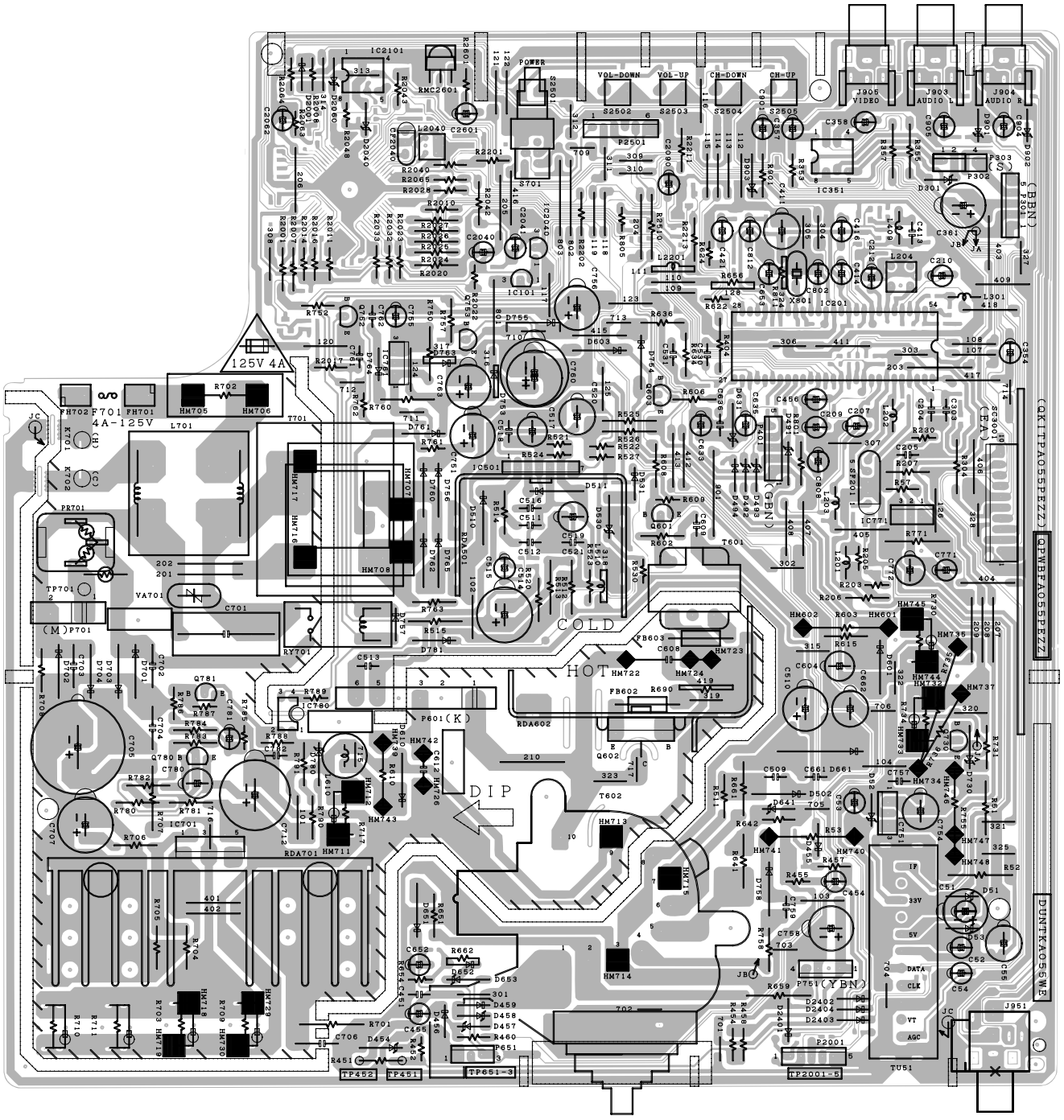
PRINTED WIRING BOARD ASSEMBLIES



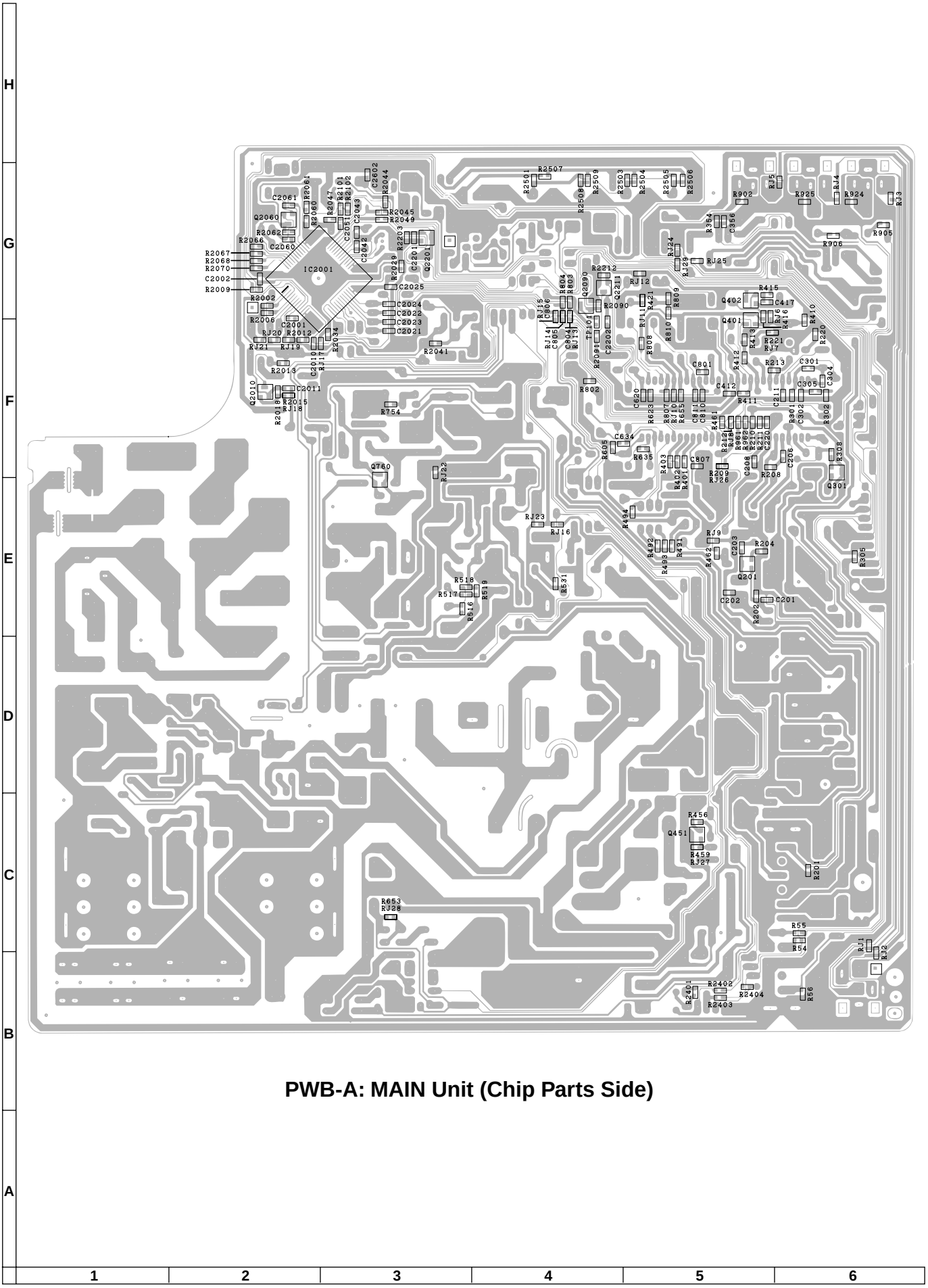
PWB-B: CRT Unit (Wiring Side)



PWB-B: CRT Unit (Chip Parts Side)



PWB-A: MAIN Unit (Wiring Side)



PWB-A: MAIN Unit (Chip Parts Side)

PARTS LIST

PARTS REPLACEMENT

Replacement parts which have these special safety characteristics identified in this manual; electrical components having such features are identified by ⚠ and shaded areas in the Replacement Parts Lists and Schematic Diagrams. The use of a substitute replacement part which dose no have the same safety characteristic as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION

in **USA**: Contact your nearest SHARP Parts Distributor to order. For location of SHARP Parts Distributor, Please call Toll-Free; 1-800-BE-SHARP

★ MARK: SPARE PARTS-DELIVERY SECTION

▲ MARK: X- RAY RELATED PARTS

LISTE DES PIECES

CHANGE DES PIECES

Les pi`eces de rechange qui pr élelesentent ces caract éleristiques sp éleciales de s élecurit éle, sont identifi élees dans ce manuel : les pi`eces élelectriques qui pr élesentent ces particularit éles, sont rep éler élee par la marque ⚠ et sont hachur élees dans les listes de pi`eces et dans les diagrammes sch élematiques.
La substitution d'une pi`ece de rechange par une autre qui ne pr éLesente pas les m éoemes caract éLeristiques de s élecurit éle que la pi`ece recommand élee parl'usine et dans ce manuel de service, peut provoquer une éLelectrocution, un incendie ou toutautre sinistre.

"COMMENT COMMANDER LES PIECES DE RECHANGE"

Pour que votre commande soit rapidement et correctement remplie, veuillez fournir les renseignements suivants.

1. NUMERO DU MODELE
2. NO. DE REF
3. NO. DE PIECE
4. DESCRIPTION

in **CANADA**: Contact SHARP Electronics of Conada Limited Phone (416) 890-2100

★MARQUE: SECTION LIVRAISON DES PIECES DE RECHANGE

▲ MARQUE: PIECES RELATIVE AUX RAYONS X

PICTURE TUBE

Ref. No.	Part No.	★	Description	Code
▲⚠ V101	VB370BVBK1S-S	R	CRT (DY601: H0143PE)	BZ
	or			
	VB34JFQ90X/*S		CRT (DY601: H0143PE)	
	or			
	VB34KPU02X/*S		CRT (DY601: H0141PE)	
	or			
	VB34JLL90X/*S		CRT (DY601: H0144PE)	
	or			
	VB37GDA86X/1E		CRT (DY601: H0142PE)	
	or			
	VB34EJM34X/1E		CRT (I.T.C.)	
▲⚠ DY601	RCiLH0141PEZZ	R	DY (CRT: A34KPU02XX)	BA
	or			
	RCiLH0142PEZZ		DY (CRT: 37GDA86X)	
	or			
	RCiLH0143PEZZ		DY (CRT: CPJ370BVBK1S	
	or		or A34JFQ90X)	
	RCiLH0144PEZZ		DY (CRT: A34JLL90X)	
⚠ L703	RCiLG0077PEZZ	R	Degaussing Coil	AK
	or			
	RCiLG0386PEZZ			
	PMAGF3045CEZZ	R	Purity Magnet	AG
	QEARC1433PEZZ	R	Grounding Strap	AF

PRINTED WIRING BOARD ASSEMBLIES
(NOT REPLACEMENT ITEM)

PWB-A DUNTKA055WEV6	–	MAIN Unit (13N-M100/150)	—
PWB-A DUNTKA055WEV8	–	MAIN Unit (CN13M10)	—
PWB-B DUNTKA056WEV6	–	CRT Unit	—

Ref. No.	Part No.	★	Description	Code

PWB-A: DUNTKA055WEV6 (13N-M100/150)
PWB-A: DUNTKA055WEV8 (CN13M10)
MAIN UNIT

TUNER

NOTE: HE PARTS HERES SHOWN ARE SUPPLIED AS AN ASSEMBLY BUT NOT INDEPENEDENTLY.

⚠ TU51	VTUENV56D82-1	J	Tuner	AZ

INTEGRATED CIRCUITS

IC101	VHiKA78S05P-1	M	KA78S05P	AD
	or			
	VHiTA7805S/-1			
▲⚠ IC201	RH-iX3354CEZZ	J	I.C.	AT
IC351	VHiAN7511//-1	J	AN7511	AK
⚠ IC501	VHiLA7840//-1	J	LA7840	AR
▲⚠ IC701	VHiSTR301301E	J	STR30130	AP
⚠ IC751	VHiKA7809Pi-1	R	KA7809PI	AE
⚠ IC761	VHiKA7812Pi-1	R	KA7812PI	AE
	or			
	VHiTA7812S/-1			
IC771	VHiKA7805Pi-1	R	KA7805PI	AE
	or			
	VHiTA7805S/-1			
IC2001	RH-iX3355CEN2	J	I.C.	AU
IC2040	VHiPST994C/-1	J	PST994C	AD
IC2101	VHiBR24C16/-1	J	BR24C16	AL
	or			
	VHiM24C01B/-1			

TRANSISTORS

You can substitute "VS2PD601AR/-1" for "VS2SC3928R/-1".

Q201	VS2SC2735//1E	J	2SC2735	AC
Q401	VS2SC3928R/-1	J	2SC3928R	AB
Q451	VS2SA1530R/-1	J	2SA1530R	AB
Q601	VS2SC2655Y/-1	J	2SC2655Y	AE
⚠ Q602	VS2SD2586//1E	J	2SD2586	AM
Q603	VS2SC945AQ/-1	J	2SC945AQ	AB
	or			
	VS2SC3198-Y-1			

PWB-A: DUNTKA055WEV6 (13N-M100/150)
PWB-A: DUNTKA055WEV8 (CN13M10)
MAIN UNIT (Continued)

Ref. No.	Part No.	★	Description	Code
Q752	VS2SC945AQ/-1 or VS2SC3198-Y-1	J	2SC945AQ	AB
Q753	VS2SA1013//1E	J	2SA1013	AD
Q2010	VS2SC3928R/-1	J	2SC3928R	AB
Q2060	VS2SC3928R/-1	J	2SC3928R	AB
Q2201	VS2SC3928R/-1	J	2SC3928R	AB
Q2211	VS2SC3928R/-1	J	2SC3928R	AB
DIODES				
D52	RH-EX0676GEZZ	J	Zener Diode, 32V	AA
D454	RH-EX0103CEZZ	J	Zener Diode, 5.6V	AB
D455	RH-DX0475CEZZ	J	Diode	AB
D456	RH-DX0475CEZZ	J	Diode	AB
D457	RH-EX0644GEZZ	J	Zener Diode, 13V	AB
D458	RH-EX0644GEZZ	J	Zener Diode, 13V	AB
D459	RH-DX0475CEZZ	J	Diode	AB
D491	RH-EX0630GEZZ	J	Zener Diode, 5.1V	AA
D492	RH-EX0630GEZZ	J	Zener Diode, 5.1V	AA
D493	RH-EX0630GEZZ	J	Zener Diode, 5.1V	AA
⚠ D502	RH-DX0131CEZZ	J	Diode	AC
D510	RH-EX0654CEZZ	J	Zender Diode	AD
D511	RH-DX0441CEZZ	J	Diode	AC
D601	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC AD
D603	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC
D610	RH-DX0131CEZZ	J	Diode	AC
D641	RH-EX0630GEZZ	J	Zener Diode, 9.1V	AA
▲⚠ D651	RH-DX0131CEZZ	J	Diode	AC
▲⚠ D653	RH-EX0667GEZZ	J	Zener Diode, 27V	AA
⚠ D661	RH-DX0229CEZZ	J	Diode	AF
⚠ D701	RH-DX0490CEZZ or RH-DX0154CEZZ	J	Diode	AC
⚠ D702	RH-DX0490CEZZ or RH-DX0154CEZZ	J	Diode	AC
⚠ D703	RH-DX0490CEZZ or RH-DX0154CEZZ	J	Diode	AC
⚠ D704	RH-DX0490CEZZ or RH-DX0154CEZZ	J	Diode	AC
D754	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC
D755	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC
⚠ D756	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC
D757	RH-DX0475CEZZ	J	Diode	AB
⚠ D758	RH-DX0131CEZZ	J	Diode	AC
⚠ D760	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC
⚠ D762	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC
⚠ D763	RH-DX0475CEZZ	J	Diode	AB
⚠ D765	RH-DX0441CEZZ or RH-DX0110CEZZ	J	Diode	AC
D2001	RH-DX0475CEZZ	J	Diode	AB
PACKAGED CIRCUITS				
⚠ PR701	RMPTP0026CEZZ	J	Packaged Circuit	AF
X801	RCRSB0001PEZZ or RCRSB0205CEZZ	R	Crystal	AL

Ref. No.	Part No.	★	Description	Code
FILTERS				
CF2040	RFiLC0121GEZZ	J	Ceramic Filter	AD
SF201	RFiLC0441CEZZ	J	SAW Filter	AH
COILS				
L201	VP-XF1R2K0000	J	Peaking 1.2µH	AB
L202	VP-XF1R2K0000	J	Peaking 1.2µH	AB
L203	VP-XF220K0000	J	Peaking 22µH	AB
L204	RCiLi0632CEZZ	J	VCO Coil	AE
L301	VP-XF150K0000	J	Peaking 15µH	AB
⚠ L701	RCiLF0069PEZZ or RCiLF0037PEZZ or RCiLF0078PEZZ or RCiLF0029PEZZ or RCiLF0090CEZZ	R	Coil (13N-M100/150)	AG
⚠ L701	RCiLF0090CEZZ	R	Coil (CN13M10)	AL
L2040	RCiLB0131CEZZ	J	Oscillation Coil	AE
L2201	VP-XFR82K0000	J	Peaking 0.82µH	AB
TRANSFORMERS				
⚠ T601	RTRNZ0168CEZZ	J	Transformer	AH
▲⚠ T602	RTRNF0156PEZZ or RTRNF0151PEZZ or RTRNF0148PEZZ	R	H-Out Transformer	AY
⚠ T701	RTRNP0527CEZZ	J	Power Transformer	AM

CAPACITORS

[EL.···Electrolytic, M-Poly.···Metalized Polypro Film]

C51	VCEA0A1CW108M	J	1000	16V	EL.	AD
C53	VCEA0A1HW105M	J	1.0	50V	EL.	AB
C54	VCEA0A1HW475M	J	4.7	50V	EL.	AB
C201	VCKYCY1HF103Z	J	0.01	50V	Ceramic	AA
C202	VCKYCY1HF103Z	J	0.01	50V	Ceramic	AA
C203	VCKYCY1HF103Z	J	0.01	50V	Ceramic	AA
C204	VCQYTA1HM223K	J	0.022	50V	Mylar	AB
C205	VCKYPA1HB103K	J	0.01	50V	Ceramic	AA
C206	VCKYCY1HB102K	J	1000p	50V	Ceramic	AA
C207	VCEA0A1CW476M	J	47	16V	EL.	AB
C208	VCKYCY1HF103Z	J	0.01	50V	Ceramic	AA
C209	VCEA0A1HW105M	J	1.0	50V	EL.	AB
C210	VCEA0A1HW474M	J	0.47	50V	EL.	AB
C211	VCKYCY1HB102K	J	1000p	50V	Ceramic	AA
C212	VCEA0A1HW474M	J	0.47	50V	EL.	AB
C220	VCKYCY1CB104K	J	0.1	16V	Ceramic	AB
C301	VCCCCY1HH470J	J	47p	50V	Ceramic	AA
C302	VCKYCY1HB102K	J	1000p	50V	Ceramic	AA
C303	VCKYPA1HB103K	J	0.01	50V	Ceramic	AA
C304	VCCCCY1HH470J	J	47p	50V	Ceramic	AA
C305	VCKYCY1HB103K	J	0.01	50V	Ceramic	AA
C354	VCEA0A1HW225M	J	2.2	50V	EL.	AB
C356	VCKYCY1HB332K	J	3300p	50V	Ceramic	AA
C357	VCEA0A1HW106M	J	10	50V	EL.	AB
C358	VCEA0A1HW106M	J	10	50V	EL.	AB
C361	VCEA0A1CW108M	J	1000	16V	EL.	AD
C411	VCEA0A1AW108M	J	1000	10V	EL.	AC
C412	VCKYCY1HB103K	J	0.01	50V	Ceramic	AA
C414	VCEA0A1HW225M	J	2.2	50V	EL.	AB
C416	VCEA0A1HW105M	J	1.0	50V	EL.	AB
C418	VCKYPA1HF103Z	J	0.01	50V	Ceramic	AA
C421	VCEA0A1HW106M	J	10	50V	EL.	AB
C451	VCQYTA1HM563K	J	0.056	50V	Mylar	AB
C454	VCEA0A1HW475M	J	4.7	50V	EL.	AB
C455	VCEA0A1CW226M	J	22	16V	EL.	AB
C456	VCEA0A1HW475M	J	4.7	50V	EL.	AB
C509	VCKYPA2HB102K	J	1000p	500V	Ceramic	AA
C510	VCEA0A1VW477M	J	470	35V	EL.	AB
C512	VCFYSA1JA224J	J	0.22	63V	Mylar	AD
C513	VCFYSA1JA473J	J	0.047	63V	Mylar	AC
C514	VCEA0A1EW108M	J	1000	25V	EL.	AD
C515	VCEA0A1HW475M	J	4.7	50V	EL.	AB
C516	VCKYPA1HB222K	J	2200p	50V	Ceramic	AA
C517	VCEA0A1CW226M	J	22	16V	EL.	AB
C520	VCEA0A1HW107M	J	100	50V	EL.	AB

PWB-A: DUNTKA055WEV6 (13N-M100/150)
PWB-A: DUNTKA055WEV8 (CN13M10)
MAIN UNIT (Continued)

Ref. No.	Part No.	★			Description	Code
C531	VCFYFA1HA564J	J	0.56	50V	Mylar	AB
C604	VCEA0A1CW227M	J	220	16V	EL.	AC
▲⚠ C608	VCFPVC3CA522H	J	5200p	1.6kV	M-Poly.	AD
C609	VCQYTA1HM223K	J	0.022	50V	Mylar	AB
C612	VCFPVC2DB334J	J	0.33	200V	M-Poly	AD
C633	VCEA0A1AW477M	J	470	10V	EL.	AC
C634	VCKYCY1HF103Z	J	0.01	50V	Ceramic	AA
C635	VCEA0A1HW105M	J	1.0	50V	EL.	AB
C636	VCQYTA1HM153K	J	0.015	50V	Mylar	AA
C652	VCEA0A1HW475M	J	4.7	50V	EL.	AB
C653	VCEA0A1HW105M	J	1.0	50V	EL.	AB
C661	VCKYPA2HB152K	J	1500p	500V	Ceramic	AA
C662	VCEA0A1CW108M	J	1000	16V	EL.	AD
⚠ C701	RC-FZ027SCEZZ or RC-FZ015SCEZZ or RC-FZ004SGEZZ or RC-FZ035SCEZZ or RC-FZ027CUMZZ	J	0.047	AC125V	Plastic	AD
C702	VCKYPB2HE103P	J	0.01	500V	Ceramic	AB
C703	VCKYPB2HE103P	J	0.01	500V	Ceramic	AB
C704	VCKYPB2HE103P	J	0.01	500V	Ceramic	AB
⚠ C705	RC-EZ1022CEZZ or RC-EZ0522CEZZ	J	470	200V	EL.	AK
⚠ C706	RC-KZ0092GEZZ or RC-KZ0311CEZZ	J	0.0033	AC125V	Ceramic	AC
C707	VCEA4A2CN226M	J	22	160V	EL.	AD
⚠ C712	RC-EZ0638CEZZ	J	33	160V	EL.	AG
C751	VCEA0A1VW477M	J	470	35V	EL.	AB
C754	VCEA0A1CW337M	J	330	16V	EL.	AC
C755	VCEA0A1CW107M	J	100	16V	EL.	AC
C756	VCEA0A1CW108M	J	1000	16V	EL.	AD
C757	VCQYTA1HM104K	J	0.1	50V	Mylar	AC
C758	VCEA0A2EW106M	J	10	250V	EL.	AD
C759	VCKYPA2HB102K	J	1000p	500V	Ceramic	AA
C760	VCEA0A1CW107M	J	100	16V	EL.	AC
C761	VCQYTA1HM333K	J	0.033	50V	Mylar	AA
C771	VCEA0A1CW476M	J	47	16V	EL.	AB
C772	VCEA0A1CW107M	J	100	16V	EL.	AC
C801	VCCCCY1HH160J	J	16p	50V	Ceramic	AA
C802	VCEA0A1HW106M	J	10	50V	EL.	AB
C807	VCKYCY1EF104Z	J	0.1	25V	Ceramic	AA
C808	VCEA0A1CW106M	J	10	16V	EL.	AB
C811	VCKYCY1CB473K	J	0.047	16V	Ceramic	AA
C812	VCEA0A1HW474M	J	0.47	50V	EL.	AB
C901	VCEA0A1HW105M	J	1.0	50V	EL.	AB
C905	VCEA0A1HW106M	J	10	50V	EL.	AB
C2001	VCCCCY1HH101J	J	100p	50V	Ceramic	AA
C2002	VCCCCY1HH101J	J	100p	50V	Ceramic	AA
C2040	VCEA0A1AW107M	J	100	10V	EL.	AB
C2041	VCEA0A1HW105M	J	1.0	50V	EL.	AB
C2060	VCKYCY1CB104K	J	0.1	16V	Ceramic	AB
C2061	VCCCCY1HH101J	J	100p	50V	Ceramic	AA
C2062	VCEA0A1AW107M	J	100	10V	EL.	AB
C2201	VCKYCY1HB682K	J	6800p	50V	Ceramic	AA
C2202	VCCCCY1HH560J	J	56p	50V	Ceramic	AA
C2601	VCEA0A1HW475M	J	4.7	50V	EL.	AB
C2602	VCCCCY1HH101J	J	100p	50V	Ceramic	AA

RESISTORS

[M-Ox.···Metal Oxide, M-Film···Metal Film]

RJ1	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ2	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ6	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ7	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ8	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ9	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ10	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ13	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ14	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ15	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ17	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ18	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ20	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ22	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ24	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ28	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
RJ29	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
⚠ R53	VRS-VV3LB223J	J	22k	3W	M-Ox.	AB
R54	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R55	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R56	VRN-MD2AL823J	J	82k	1/10W	M-Film	AA
R57	VRD-RA2BE563J	J	56k	1/8W	Carbon	AA
R201	VRN-MD2AL221J	J	220	1/10W	M-Film	AA
R202	VRN-MD2AL122J	J	1.2k	1/10W	M-Film	AA
R203	VRD-RA2BE682J	J	6.8k	1/8W	Carbon	AA
R204	VRN-MD2AL270J	J	27	1/10W	M-Film	AA
R205	VRD-RA2BE680J	J	68	1/8W	Carbon	AA
R206	VRD-RA2EE151J	J	150	1/4W	Carbon	AA
R207	VRD-RA2BE123J	J	12k	1/8W	Carbon	AA
R208	VRN-MD2AL332J	J	3.3k	1/10W	M-Film	AA
R209	VRN-MD2AL123J	J	12k	1/10W	M-Film	AA
R210	VRN-MD2AL104J	J	100k	1/10W	M-Film	AA
R211	VRN-MD2AL104J	J	100k	1/10W	M-Film	AA
R220	VRN-MD2AL331J	J	330	1/10W	M-Film	AA
R301	VRN-MD2AL102J	J	1.0k	1/10W	M-Film	AA
R302	VRN-MD2AL332J	J	3.3k	1/10W	M-Film	AA
R353	VRD-RA2BE683J	J	68k	1/8W	Carbon	AA
R354	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R355	VRD-RA2BE223J	J	22k	1/8W	Carbon	AA
R357	VRD-RA2BE822J	J	8.2k	1/8W	Carbon	AA
R401	VRN-MD2AL470J	J	47	1/10W	M-Film	AA
R402	VRN-MD2AL470J	J	47	1/10W	M-Film	AA
R403	VRN-MD2AL470J	J	47	1/10W	M-Film	AA
R404	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R410	VRN-MD2AL471J	J	470	1/10W	M-Film	AA
R411	VRN-MD2AL684J	J	680k	1/10W	M-Film	AA
R412	VRN-MD2AL102J	J	1.0k	1/10W	M-Film	AA
R413	VRN-MD2AL152J	J	1.5k	1/10W	M-Film	AA
R421	VRN-MD2AL223J	J	22k	1/10W	M-Film	AA
⚠ R451	VRS-SV2HC103J	J	10k	1/2W	M-Ox.	AA
R452	VRD-RA2BE152J	J	1.5k	1/8W	Carbon	AA
R454	VRD-RA2BE334J	J	330k	1/8W	Carbon	AA
R455	VRD-RA2BE392J	J	3.9k	1/8W	Carbon	AA
R456	VRN-MD2AL273J	J	27k	1/10W	M-Film	AA
R457	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R458	VRD-RA2BE564J	J	560k	1/8W	Carbon	AA
R460	VRD-RA2BE152J	J	1.5k	1/8W	Carbon	AA
R461	VRN-MD2AL184J	J	180k	1/10W	M-Film	AA
R462	VRN-MD2AL273J	J	27k	1/10W	M-Film	AA
R491	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
R492	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
R493	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
R494	VRN-MD2AL000J	J	0	1/10W	M-Film	AA
⚠ R511	VRN-SV2HB3R9J	J	3.9	1/2W	M-Film	AB
R512	VRS-VV3AB102J	J	1.0k	1W	M-Ox.	AA
R513	VRS-VV3AB102J	J	1.0k	1W	M-Ox.	AA
R514	VRD-RM2HD1R0J	J	1.0	1/2W	Carbon	AA
R515	VRS-VV3AB391J	J	390	1W	M-Ox.	AA
R516	VRN-MD2AL153J	J	15k	1/10W	M-Film	AA
R517	VRN-MD2AL102J	J	1.0k	1/10W	M-Film	AA
R518	VRN-MD2AL333J	J	33k	1/10W	M-Film	AA
R519	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R520	VRD-RM2HD1R2J	J	1.2	1/2W	Carbon	AA
R522	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R523	VRD-RA2BE562J	J	5.6k	1/8W	Carbon	AA
R525	VRD-RA2BE272J	J	2.7k	1/8W	Carbon	AA
R527	VRD-RA2BE223J	J	22k	1/8W	Carbon	AA
R602	VRD-RA2EE820J	J	82	1/4W	Carbon	AA
⚠ R603	VRS-VV3LB270J	J	27	3W	M-Ox.	AB
R605	VRN-MD2AL332J	J	3.3k	1/10W	M-Film	AA
R606	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R608	VRD-RA2BE101J	J	100	1/8W	Carbon	AB
R609	VRD-RA2BE331J	J	330	1/8W	Carbon	AA
⚠ R610	VRS-VV3DB391J	J	390	2W	M-Ox.	AA
R615	VRD-RM2HD332J	J	3.3k	1/2W	Carbon	AA
R622	VRD-RA2BE222J	J	2.2k	1/8W	Carbon	AA
R623	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R624	VRN-RA2BK472F	J	4.7k	1/8W	M-Film	AA

PWB-A: DUNTKA055WEV6 (13N-M100/150)
PWB-A: DUNTKA055WEV8 (CN13M10)
MAIN UNIT (Continued)

Ref. No.	Part No.	★			Description	Code
R634	VRD-RM2HD151J	J	150	1/2W	Carbon	AA
R635	VRN-MD2AL332J	J	3.3k	1/10W	M-Film	AA
R636	VRD-RM2HD121J	J	120	1/2W	Carbon	AA
⚠ R641	VRS-VV3AB682J	J	6.8k	1W	M-Ox.	AA
▲⚠ R651	VRD-RM2HD1R0J	J	1.0	1/2W	Carbon	AA
▲⚠ R654	VRD-RA2BE154J	J	150k	1/8W	Carbon	AA
▲⚠ R655	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
⚠ R659	VRN-VV3AB1R8J	J	1.8	1W	M-Film	AA
⚠ R661	VRN-VV3ABR47J	J	0.47	1W	M-Film	AA
▲⚠ R662	VRD-RA2BE822G	J	8.2k	1/8W	Carbon	AA
⚠ R701	RR-DZ0047CEZZ or RR-HZ0046CEZZ or VRC-UB2HG275K	J	2.7M	1/21W	Solid	AD
⚠ R702	VRW-KP3HC1R8K	J	1.8	5W	Cement	AC
⚠ R703	VRS-KA3NG561J	J	560	7W	M-Ox.	AF
R704	VRD-RM2HD123J	J	12k	1/2W	Carbon	AA
R705	VRD-RA2EE334J	J	330k	1/4W	Carbon	AA
R706	VRD-RM2HD470J	J	47	1/2W	Carbon	AA
⚠ R707	VRN-VV3DB1R5J	J	1.5	2W	M-Film	AB
⚠ R708	VRD-RM2HD824J	J	820k	1/2W	Carbon	AA
⚠ R709	VRS-KA3NG561J	J	560	7W	M-Ox.	AF
⚠ R717	VRS-KA3HG3R3K	J	3.3	5W	M-Ox.	AD
⚠ R736	VRS-VV3LB330J	J	33	3W	M-Ox.	AB
⚠ R750	VRS-VV3AB561J	J	560	1W	M-Ox.	AA
R752	VRD-RA2BE562J	J	5.6k	1/8W	Carbon	AA
R754	VRN-MD2AL471J	J	470	1/10W	M-Film	AA
⚠ R755	VRS-VV3LB270J	J	27	3W	M-Ox.	AB
R757	VRD-RA2BE472J	J	4.7k	1/8W	Carbon	AA
⚠ R758	VRS-SV2HC150J	J	15	1/2W	M-Ox.	AA
R763	VRD-RA2EE473J	J	47k	1/4W	Carbon	AA
R771	VRS-VV3DB330J	J	33	2W	M-Ox.	AA
R801	VRD-RM2HD470J	J	47	1/2W	Carbon	AA
R807	VRN-MD2AL272J	J	2.7k	1/10W	M-Film	AA
R808	VRN-MD2AL272J	J	2.7k	1/10W	M-Film	AA
R809	VRN-MD2AL223J	J	22k	1/10W	M-Film	AA
R810	VRN-MD2AL223J	J	22k	1/10W	M-Film	AA
R901	VRD-RA2BE101J	J	100	1/8W	Carbon	AB
R902	VRN-MD2AL750J	J	75	1/10W	M-Film	AA
R906	VRN-MD2AL102J	J	1.0k	1/10W	M-Film	AA
R925	VRN-MD2AL104J	J	100k	1/10W	M-Film	AA
R961	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R962	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2001	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R2002	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R2006	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R2007	VRD-RA2BE223J	J	22k	1/8W	Carbon	AA
R2008	VRD-RA2BE333J	J	33k	1/8W	Carbon	AA
R2009	VRN-MD2AL102J	J	1.0k	1/10W	M-Film	AA
R2010	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R2011	VRD-RA2BE103J	J	10k	1/8W	Carbon	AA
R2013	VRN-MD2AL682J	J	6.8k	1/10W	M-Film	AA
R2016	VRD-RA2BE223J	J	22k	1/8W	Carbon	AA
R2017	VRD-RA2BE103J	J	10k	1/8W	Carbon	AA
R2018	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R2020	VRD-RA2BE223J	J	22k	1/8W	Carbon	AA
R2022	VRD-RA2BE333J	J	33k	1/8W	Carbon	AA
R2023	VRD-RA2BE223J	J	22k	1/8W	Carbon	AA
R2024	VRD-RA2BE682J	J	6.8k	1/8W	Carbon	AA
R2025	VRD-RA2BE682J	J	6.8k	1/8W	Carbon	AA
R2026	VRD-RA2BE682J	J	6.8k	1/8W	Carbon	AA
R2027	VRD-RA2BE682J	J	6.8k	1/8W	Carbon	AA
R2028	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R2029	VRN-MD2AL102J	J	1.0k	1/10W	M-Film	AA
R2032	VRD-RA2BE471J	J	470	1/8W	Carbon	AA
R2033	VRD-RA2BE684J	J	680k	1/8W	Carbon	AA
R2034	VRN-MD2AL684J	J	680k	1/10W	M-Film	AA
R2040	VRD-RA2BE102J	J	1.0k	1/8W	Carbon	AA
R2041	VRN-MD2AL333J	J	33k	1/10W	M-Film	AA
R2042	VRD-RA2BE101J	J	100	1/8W	Carbon	AB
R2043	VRD-RA2BE101J	J	100	1/8W	Carbon	AB
R2044	VRN-MD2AL683J	J	68k	1/10W	M-Film	AA
R2045	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2047	VRN-MD2AL221J	J	220	1/10W	M-Film	AA
R2048	VRD-RA2BE562J	J	5.6k	1/8W	Carbon	AA
R2049	VRN-MD2AL333J	J	33k	1/10W	M-Film	AA
R2060	VRN-MD2AL221J	J	220	1/10W	M-Film	AA
R2061	VRN-MD2AL562J	J	5.6k	1/10W	M-Film	AA
R2062	VRN-MD2AL183J	J	18k	1/10W	M-Film	AA
R2063	VRD-RA2BE222J	J	2.2k	1/8W	Carbon	AA
R2064	VRD-RA2BE332J	J	3.3k	1/8W	Carbon	AA
R2066	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R2067	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R2068	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R2070	VRN-MD2AL103J	J	10k	1/10W	M-Film	AA
R2101	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2102	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2201	VRD-RA2BE103J	J	10k	1/8W	Carbon	AA
R2202	VRD-RA2BE473J	J	47k	1/8W	Carbon	AA
R2203	VRN-MD2AL332J	J	3.3k	1/10W	M-Film	AA
R2211	VRD-RA2BE222J	J	2.2k	1/8W	Carbon	AA
R2212	VRN-MD2AL682J	J	6.8k	1/10W	M-Film	AA
R2213	VRD-RA2BE223J	J	22k	1/8W	Carbon	AA
R2401	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2402	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2403	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2404	VRN-MD2AL101J	J	100	1/10W	M-Film	AA
R2501	VRN-MD2AL123J	J	12k	1/10W	M-Film	AA
R2503	VRN-MD2AL273J	J	27k	1/10W	M-Film	AA
R2504	VRN-MD2AL123J	J	12k	1/10W	M-Film	AA
R2505	VRN-MD2AL563J	J	56k	1/10W	M-Film	AA
R2506	VRN-MD2AL563J	J	56k	1/10W	M-Film	AA
R2507	VRN-MD2AL823J	J	82k	1/10W	M-Film	AA
R2508	VRN-MD2AL153J	J	15k	1/10W	M-Film	AA
R2509	VRN-MD2AL272J	J	2.7k	1/10W	M-Film	AA
R2601	VRD-RA2BE331J	J	330	1/8W	Carbon	AA

SWITCHES

S2501	QSW-K0202PEZZ or QSW-K0079GEZZ	R	Power	AC
S2502	QSW-K0202PEZZ or QSW-K0079GEZZ	R	VOL-Down	AC
S2503	QSW-K0202PEZZ or QSW-K0079GEZZ	R	VOL-Up	AC
S2504	QSW-K0202PEZZ or QSW-K0079GEZZ	R	CH-Down	AC
S2505	QSW-K0202PEZZ or QSW-K0079GEZZ	R	CH-Up	AC

MISCELLANEOUS PARTS

⚠ RY701	RRLYU0041CEZZ or RRLYJ0077CEZZ or RRLYJ0090CEZZ	J	Relay	AG
⚠ F701	QFS-B4023CEZZ or QFS-B4021GEZZ	J	Fuse 4A(125V)	AC
FH701	QFSHD1013CEZZ	J	Fuse Holder	AC
FH702	QFSHD1014CEZZ	J	Fuse Holder	AC
FB602	RBLN-0037CEZZ	J	Ferrite Bead	AB
FB603	RBLN-0037CEZZ	J	Ferrite Bead	AB
J903	QJAKE0159CEZZ	J	Jack, Audio IN	AF
J905	QJAKE0158CEZZ	J	Jack, Video IN	AF
P302	QPLGN0241CEZZ	J	Plug, 2-pin (S)	AA
P401	QPLGN0541CEZZ	J	Plug, 5-pin (GBN)	AB
P601	QPLGN0660CEZZ	J	Plug, 6-pin (K)	AC
P651	QPLGN0341CEZZ	J	Plug, 3-pin (TP651-3)	AA
P701	QPLGN0260CEZZ	J	Plug, 2-pin (M)	AC
P751	QPLGN0441CEZZ	J	Plug, 4-pin (YBN)	AB
P2001	QPLGN0541CEZZ	J	Plug, 5-pin (TP2001-5)	AB
RMC2601	RRMCU0232CEZZ	J	R/C Receiver	AG
RDA501	PRDAR0297PEFW	R	Heat Sink, for IC501	AD
RDA701	PRDAR0237PEFW	R	Heat Sink, for IC701	AK
TP701	QLUGP0102PEZZ	R	Lug, Test Point	AA
	LX-BZ3049GEFD	J	Screw	AA
	LX-BZ3100CEFD	J	Screw	AA
	LX-TZ3004CEFD	J	Screw	AA
	PZETM0016CEZZ	J	Insulator	AB

PWB-B: DUNTKA056WEV6
CRT UNIT

Ref. No.	Part No.	★	Description	Code
			TRANSISTORS	
Q852	VS2SC2229O/1E	J	2SC2229 (O)	AD
Q854	VS2SC2229O/1E	J	2SC2229 (O)	AD
Q856	VS2SC2229O/1E	J	2SC2229 (O)	AD
Q881	VS2SA1266-Y-1	J	2SA1266 (Y)	AA
	or			
	VS2SA1015-Y-1			
			DIODES	
D881	RH-DX0475CEZZ	J	Diode	AB
D882	RH-DX0475CEZZ	J	Diode	AB
D885	RH-DX0475CEZZ	J	Diode	AB
			COIL	
L851	VP-DF820K0000	J	Peaking 82µH	AB
			CAPACITORS	
			[EL.···Electrolytic]	
C851	VCCCCY1HH151J	J	150p 50V Ceramic	AA
C852	VCCCCY1HH151J	J	150p 50V Ceramic	AA
C853	VCCCPA1HH151J	J	150p 50V Ceramic	AA
C854	RC-KZ0160GEZZ	J	0.01 1.4kV Ceramic	AC
	or			
	RC-KZ0029CEZZ			
C881	VCEA0A1CW106M	J	10 16V EL.	AB
C883	VCEA0A1CW336M	J	33 16V EL.	AB
			RESISTORS	
			[M-Ox.···Metal Oxide, M-Film···Metal Film]	
R852	VRD-RA2BE221J	J	220 1/8W Carbon	AA
R853	VRN-MD2AL121J	J	120 1/10W M-Film	AA
⚠ R857	VRS-VV3AB123J	J	12k 1W M-Ox.	AA
R858	VRD-RM2HD332J	J	3.3k 1/2W Carbon	AA
R860	VRD-RA2BE221J	J	220 1/8W Carbon	AA
R861	VRN-MD2AL121J	J	120 1/10W M-Film	AA
⚠ R865	VRS-VV3AB123J	J	12k 1W M-Ox.	AA
R866	VRD-RM2HD332J	J	3.3k 1/2W Carbon	AA
R867	VRN-MD2AL470J	J	47 1/10W M-Film	AA
R868	VRN-MD2AL221J	J	220 1/10W M-Film	AA
R869	VRN-MD2AL121J	J	120 1/10W M-Film	AA
⚠ R873	VRS-VV3AB123J	J	12k 1W M-Ox.	AA
R874	VRD-RM2HD332J	J	3.3k 1/2W Carbon	AA
R881	VRN-MD2AL561J	J	560 1/10W M-Film	AA
R882	VRN-MD2AL391J	J	390 1/10W M-Film	AA
R883	VRD-RA2BE561J	J	560 1/8W Carbon	AA
R884	VRN-MD2AL152J	J	1.5k 1/10W M-Film	AA
R886	VRN-MD2AL431J	J	430 1/10W M-Film	AA
R887	VRD-RA2BE470J	J	47 1/8W Carbon	AA
R890	VRN-MD2AL470J	J	47 1/10W M-Film	AA
R891	VRN-MD2AL470J	J	47 1/10W M-Film	AA
			MISCELLANEOUS PARTS	
P851	QPLGN0541CEZZ	J	Plug, 5-pin (GBN)	AB
P852	QPLGN0441CEZZ	J	Plug, 4-pin (YBN)	AB
SC851	QSOCV0839CEZZ	J	CRT Socket	AK
	or			
	QSOCV0842CEZZ			

MISCELLANEOUS PARTS

Ref. No.	Part No.	★	Description	Code
⚠ ACC701	QACCD3090CESA	J	AC Cord	AK
	or			
	QACCD3060CESA			
	or			
	QACCD3064CESA			
SP1	VSP0080PBP8YA	J	Speaker, 32ohm	AK
	QCNW-2105PEZZ	R	Connecting Cord	AF
	QCNW-2106PEZZ	R	Connecting Cord	AE
	QCNW-2107PEZZ	R	Connecting Cord	AE

SUPPLIED ACCESSORIES

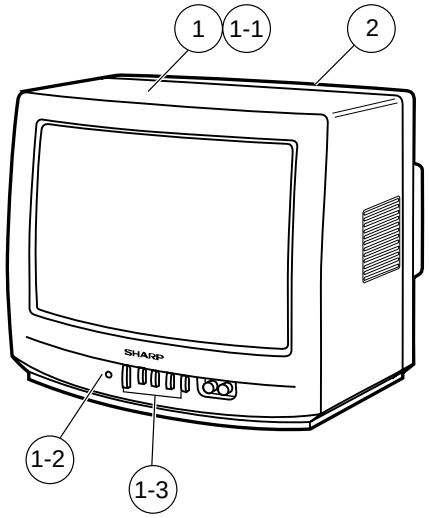
Ref. No.	Part No.	★	Description	Code
	RRMCG1324CESA	J	Infrared R/C Unit (13N-M100, CN13M10)	AT
	RRMCG1324CESB	J	Infrared R/C Unit (13N-M150)	AT
	TiNS-6895PEZZ	R	Operation Manual (13N-M100/150)	AD
	TiNS-6967PEZZ	R	Operation Manual (CN13M10)	AF

PACKING PARTS
(NOT REPLACEMENT ITEM)

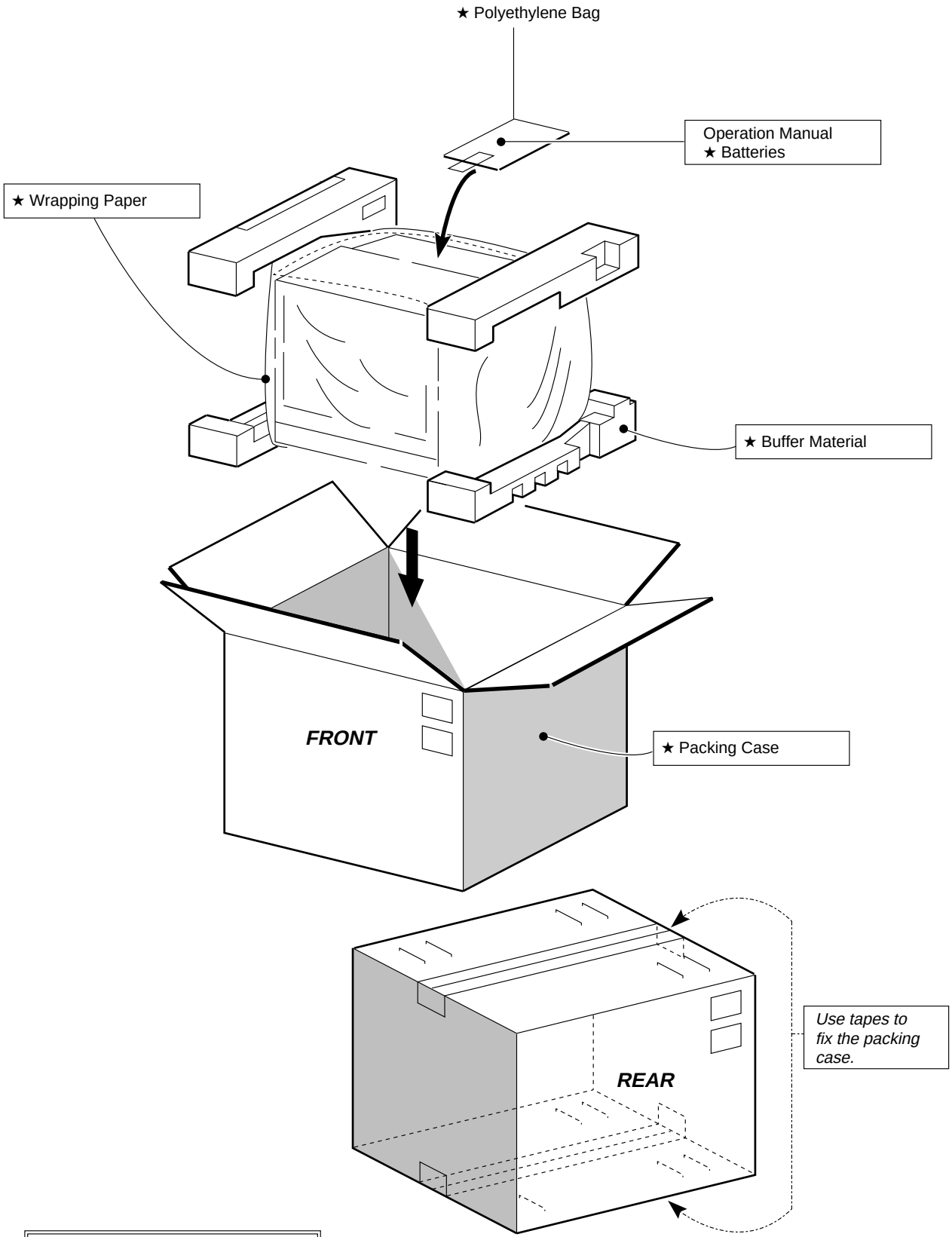
Ref. No.	Part No.	★	Description	Code
	SPAKC6619PEZZ	–	Packing Case (13N-M100)	—
	SPAKC6620PEZZ	–	Packing Case (13N-M150)	—
	SPAKC6633PEZZ	–	Packing Case (CN13M10)	—
	SPAKP0031PEZZ	–	Wrapping Paper	—
	SPAKP0110PEZZ	–	Wrapping Paper	—
	SPAKX2630PEZZ	–	Buffer Material	—
	SSAKA0001PEZZ	–	Polyethylene Bag	—

CABINET PARTS

Ref. No.	Part No.	★	Description	Code
1	CCABA2552WEV0	R	Front Cabinet Ass'y (13N-M100)	AX
1	CCABA2552WEV2	R	Front Cabinet Ass'y (13N-M150)	AX
1	CCABA2566WEV0	R	Front Cabinet Ass'y (CN13M10)	AZ
1-1	*Not Available*	–	Front Cabinet	—
1-2	GCOVA0078PEKA	R	R/C Cover	AD
1-3	JBTN-0306PESA	R	Button (13N-M100, CN13M10)	AD
1-3	JBTN-0306PESB	R	Button (13N-M150)	AD
2	GCABB2309PEKA	R	Rear Cabinet (13N-M100)	AW
2	GCABB2309PEKB	R	Rear Cabinet (13N-M150)	AW
2	GCABB2325PEKA	R	Rear Cabinet (CN13M10)	AW



PACKING OF THE SET



★ **MARK** : Not Replacement Items.

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